RECEIVED
CENTRAL FAX CENTER
MAR 03 2006

PTO/SB/21 (09-04)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	09/929,227
Filing Date	August 13, 2001
First Named Inventor	Stephen F. Gass
Art Unit	3724
Examiner Name	Boyer D. Ashley
Attorney Docket Number	SDT 304
Total Number of Pages in This Submission	75

ENCLOSURES *(Check all that apply)*

- ☐ Fee Transmittal Form
  - ☑ Fee Attached
- ☐ Amendment/Reply
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Reply to Missing Parts/ Incomplete Application
  - ☐ Reply to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) ________
  - ☐ Landscape Table on CD
- ☐ After Allowance Communication to TC
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☑ Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
- ☐ Proprietary Information
- ☐ Status Letter
- ☐ Other Enclosure(s) (please Identify below):

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	SD3, LLC		
Signature	David Fanning		
Printed name	David A. Fanning		
Date	March 3, 2006	Reg. No.	33,233

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:

Signature	David Fanning		
Typed or printed name	David A. Fanning	Date	March 3, 2006

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of
STEPHEN F. GASS and DAVID S. D'ASCENZO

Date: March 3, 2006

Serial No.: 09/929,227

Examiner Boyer D. Ashley

Filed: August 13, 2001

Group Art Unit 3724

For: SPRING-BIASED BRAKE MECHANISM FOR POWER EQUIPMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

APPEAL BRIEF

1. Real party in interest.

The real party in interest is SD3, LLC, the assignee of the above-identified application. SD3 is a privately owned Oregon limited liability company.

2. Related appeals and interferences.

All other known prior and pending appeals, interferences or judicial proceedings which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal are listed below. These appeals are listed because SD3, LLC is the real party in interest and the appeals relate to various aspects of safety systems for power equipment. The appeal of application serial number 10/100,211 and the present appeal both involve related double patenting issues and the issue of whether certain statements in U.S. Patent 3,785,230 to Friemann are enabled.

1. Appeal of application serial number 09/929,221 (appeal brief filed, awaiting examiner's answer).

2. Appeal of application serial number 09/929,238 (appeal brief filed, awaiting examiner's answer).
3. Appeal of application serial number 09/929,240 (appeal brief filed, awaiting examiner's answer).
4. Appeal of application serial number 09/929,242 (appeal brief filed, awaiting examiner's answer).
5. Appeal of application serial number 09/929,425 (appeal brief filed, awaiting examiner's answer).
6. Appeal of application serial number 09/929,426 (examiner reopened prosecution after applicant filed an appeal brief).
7. Appeal of application serial number 10/053,390 (appeal brief filed, awaiting examiner's answer).
8. Appeal of application serial number 10/100,211 (appeal brief filed, awaiting examiner's answer).
9. Appeal of application serial number 10/189,027 (appeal brief filed, awaiting examiner's answer).
10. Appeal of application serial number 10/189,031 (appeal brief filed, awaiting examiner's answer).
11. Appeal of application serial number 10/243,042 (examiner reopened prosecution after applicant filed an appeal brief).
12. Appeal of application serial number 10/292,607 (notice of appeal filed).

3. Status of claims.

The application was filed with claims 1-20 and claims 21-31 were added during prosecution. Claims 2, 5, 8, 13-18 and 20 were cancelled without prejudice and claims 6, 7, 9-12 and 21-30 were withdrawn from consideration. Claims 1, 3, 4, 19 and 31 are rejected. The appealed claims are claims 1, 3, 4, 19 and 31.

4. Status of amendments.

All amendments have been entered.

5. Summary of claimed subject matter.

The claims at issue in this appeal relate to new safety systems for woodworking machines such as table saws, miter saws, chop saws, radial arm saws, circular saws, band saws, jointers, and planers. These machines have cutting tools or blades that present a danger to persons using the machines, and each year tens of thousands of people in the United States are severely injured on these machines.[1] Generally, the safety systems include a detection subsystem to detect a dangerous condition between a person and the cutting tool and a reaction subsystem to mitigate any possible injury when the dangerous condition is detected. One embodiment of the technology is a table saw configured to detect contact between a person and the blade and to stop the blade upon detection of contact. Such table saws are now being sold under the name SawStop and those saws have already saved the hands or fingers of at least 31

---

[1] The U.S. Consumer Product Safety Commission, National Electronic Injury Surveillance System, Directorate for Epidemiology, estimates 58,958 injuries involving various types of power saws and 20,899 injuries involving "saws, not specified" during 2004. (These statistics are publicly available at www.cpsc.gov. The relevant product codes for searching include codes 825, 832, 841, 842, 843, and 845.)

different people who had accidents while using the saws.[2] Those people likely would have suffered life-changing lacerations or amputations if they had been working on non-SawStop saws. Instead, in each case the person walked away with no more than a scratch. Applicant has filed a number of patent applications on various aspects and configurations of the new safety systems, and this is one of those applications. This application focuses on woodworking machines with actuators having stored energy sufficient to move a brake or some other moveable component within approximately 3 milliseconds after the dangerous condition is detected to mitigate or prevent injury.

Specifically, independent claim 1, describes a woodworking machine having a support frame (shown schematically at 10 in Figure 1), a motor supported by the support frame (shown schematically at 16 in Figure 1), and a cutting tool supported by the frame and moveable by the motor (such as blade 40 shown in Figures 2-13). The machine also includes a detection system adapted to detect a dangerous condition between a person and the cutting tool (such as detection subsystem 22 shown schematically in Figure 1). Detection systems are discussed in paragraphs 30 and 31 of the published specification and on page 6, lines 3-20 in the specification as submitted. An exemplary implementation of a detection system is discussed in paragraph 35 of the published specification and on page 9, lines 5-20 in the specification as submitted. The machine also includes a brake component adapted to engage the cutting tool (such as brake mechanism 28 in Figure 1 and brake pawl 60 in Figures 2-17 and 19). The brake component has a ready position spaced apart from the cutting tool. The machine also

---

[2] SawStop saws are made and sold by SawStop, LLC, a wholly-owned subsidiary of applicant SD3, LLC. Pictures and videos of SawStop saws can be seen on the Internet at www.sawstop.com.

includes an actuator having stored energy sufficient to move the brake component from the ready position into engagement with the cutting tool within approximately 3 milliseconds or less after the dangerous condition is detected (such as biasing mechanism 30 shown schematically in Figure 1 and such as the various springs shown in the Figures, including spring 66 shown in Figures 2 and 3). Actuators, and factors that must be considered to achieve the desired movement, are discussed generally in paragraphs 43-48 of the published specification and on page 14, line 10 through page 17, line 15 in the specification as submitted. Embodiments of various actuators are discussed throughout the specification.

Independent claim 19 describes a woodworking machine with several means-plus-function limitations. The machine includes a cutting tool and means for driving the cutting tool. The structure, material or acts described in the specification as corresponding to that recited function include motor assembly 16 shown schematically in Figure 1. The machine also includes means for detecting a dangerous condition between a person and the cutting tool. The structure, material or acts described in the specification as corresponding to that recited function include detection subsystem 22 shown schematically in Figure 1 and the various detection systems identified above in connection with claim 1. The machine also includes a brake component spaced apart from the cutting tool (such as brake mechanism 28 in Figure 1 and brake pawl 60 in Figures 2-17 and 19). The machine also includes means for moving the brake component into contact with the cutting tool within 3 milliseconds or less after the dangerous condition is detected. The structure, material or acts described in the specification as corresponding to that recited function include various ones of biasing

mechanism 30 shown schematically in Figure 1, spring 66 shown in Figures 2 and 3, the springs shown in Figures 4-14, 16-19 and 21, and the different actuators discussed throughout the specification and shown in Figures 8-21. The recited function is discussed generally in paragraphs 43-48 of the published specification and on page 14, line 10 through page 17, line 15 in the specification as submitted, as well as at other locations in the specification.

Independent claim 31 describes a woodworking machine having a support frame (shown schematically at 10 in Figure 1), a motor supported by the support frame (shown schematically at 16 in Figure 1), and a cutting tool supported by the frame and moveable by the motor (such as blade 40 shown in Figures 2-13). The machine also includes a detection system adapted to detect a dangerous condition between a person and the cutting tool (such as detection subsystem 22 shown schematically in Figure 1). The machine also includes a mechanism having a moveable component adapted to move upon detection of the dangerous condition by the detection system, where movement of the moveable component contributes to the mitigation or prevention of injury to the person. Examples of such moveable components include brake mechanism 28 shown in Figure 1 and brake pawl 60 shown in Figures 2-17 and 19. The machine also includes an actuator having stored energy sufficient to start moving the moveable component within 3 milliseconds after the dangerous condition is detected. Examples of such an actuator include biasing mechanism 30 shown schematically in Figure 1, spring 66 shown in Figures 2 and 3, the springs shown in Figures 4-14, 16-19 and 21, and the different actuators discussed throughout the specification and shown in Figures 8-21.

6. Grounds of rejection to be reviewed on appeal.

The grounds of rejection presented for review are:

1) a rejection of claims 1, 19 and 31 under 35 USC 103(a) as obvious in light of Yoneda (US Patent 4,117,752) combined with Andreasson (US Patent 4,653,189) and Friemann (US Patent 3,858,095);

2) a rejection of claims 3 and 4 under 35 USC 103(a) as obvious in light of Yoneda combined Andreasson, Friemann, Baur (US Patent 3,695,116) and Bielinski (US Patent 5,606,889);

3) a rejection of claim 19 under 35 USC 103(a) as obvious in light of Yoneda in view of Friemann; and

4) a provisional, obviousness-type double patenting rejection of claim 19 in light of claims 1, 17 and 19-28 from co-pending application 10/100,211 in view of Friemann.

7. Argument.

<u>Obviousness under 35 USC 103(a)</u>

<u>I. Claims 1, 19 and 31 in light of Yoneda combined with Andreasson and Friemann.</u>

<u>A. Claim 1.</u>

Claim 1 was rejected under 35 USC 103(a) as obvious in light of Yoneda combined with Andreasson and Friemann. Yoneda discloses a system for stopping a band blade of a cutting apparatus when a person contacts the blade. The apparatus includes a band blade looped around several pulleys. (Yoneda, Fig. 1.) A motor drives one of the pulleys to move the cutter and a user slides a workpiece past the moving cutter to cut the workpiece. If a user touches the blade, then an electromagnetic clamp

brake clamps the sides of the blade and another electromagnetic brake grips a plate integral with one of the pulleys. (Yoneda, column 2, lines 34-41.)

The Examiner says Yoneda discloses the invention substantially as claimed, but fails to disclose an actuator capable of moving a brake component into engagement with a cutting tool within approximately 3 milliseconds. The Examiner cites Friemann to show a brake that purportedly works within 5 milliseconds, and then says it would have been obvious to use 3 milliseconds instead of 5 milliseconds "in order to increase the ability of the device to prevent accidents because it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art." (Final Office Action mailed 10/4/05, p. 4.)

The Board should reverse this rejection because: 1) Friemann fails to enable a brake actuated within 3 or 5 milliseconds, 2) the 3 millisecond limitation is more than a result-effective variable, 3) the cited references fail to disclose all claim limitations, and 4) there is no suggestion to combine the references. These points are explained below.

1. Friemann fails to enable a brake actuated within 3 or 5 milliseconds.

Friemann discloses a protective circuit for band cutter machines used in the textile industry. (Friemann, column 1, lines 5-11.) The machine includes a band cutter looped around several wheels. (Friemann, Figure 2.) A motor drives one of the wheels to move the cutter and a user slides a piece of textile past the moving cutter to cut the textile. The protective circuit is designed to stop the cutter in the event a person touches the moving cutter. (Friemann, column 1, lines 45-47.) The protective circuit stops the cutter by triggering direct current braking of the motor and by triggering an electromechanical brake to decelerate the drive pulley or flywheel of the motor.

(Friemann, column 3, lines 66-68 & column 4, lines 3-5.) Stopping the motor and pulleys causes the band cutter to stop.

The Friemann patent includes one statement saying "it is possible" for a protective circuit as disclosed to stop the band cutter in about 1/200th of a second (5 milliseconds), and a second statement saying the circuit "stops" the band cutter within 1/100th of a second (10 milliseconds). (Friemann, column 2, lines 15-20, and column 3, line 68 to column 4, line 6.) These statements, however, are incorrect. It is physically impossible for the mechanism disclosed in Friemann to stop the band cutter within 5 or 10 milliseconds. The two statements are either mistakes or overstatements made during the drafting of the patent.

Applicant submitted a declaration of Dr. David A. Turcic, an associate professor of mechanical engineering at Portland State University in Portland, Oregon, explaining why Friemann fails to enable a brake actuated within 5 milliseconds.[3] Dr. Turcic explains that Friemann discloses brakes triggered by relays, but the relays themselves require at least 5 to 15 milliseconds or more to operate. (Turcic Declaration, ¶¶ 10-12.) Additionally, Friemann's brakes operate only after a wire coil creates an electromagnetic force, but it takes time to charge the wire coil because of inductance. (Turcic Declaration, ¶ 21.) Because of these time constraints, Friemann's system physically cannot move a brake component into engagement with a cutting tool within 5 milliseconds, and certainly not within approximately 3 milliseconds. Dr. Turcic's

[3] Dr. Turcic's declaration was originally submitted in co-pending application 10/100,211. A copy of the declaration was subsequently submitted as evidence in the present application.

declaration is uncontested and it establishes by a preponderance of the evidence that Friemann fails to enable or even suggest an actuator as required by claim 1.

Friemann's lack of enablement is significant because, in order to support an obviousness rejection, the cited references "must provide an enabling disclosure, i.e., they must place the claimed invention in the possession of the public. ... An invention is not 'possessed' absent some known or obvious way to make it." In re Payne, 606 F.2d 303, 314, 203 USPQ 245, 255 (CCPA 1979) (citations omitted); see also In re Kumar, 418 F.3d 1361, 1369, 76 USPQ2d 1048 (Fed. Cir. 2005) ("To render a later invention unpatentable for obviousness, the prior art must enable a person of ordinary skill in the field to make and use the later invention."); Motorola, Inc. v. Interdigital Technology Corp., 121 F.3d 1461, 1471, 43 USPQ2d 1481 (Fed. Cir. 1997) (district court correctly instructed the jury that prior art must be enabling to invalidate claims as obvious); Beckman Instruments, Inc. v. LKB Produkter AB, 892 F.2d 1547, 1551, 13 USPQ2d 1301, 1304 (Fed. Cir. 1989) ("In order to render a claimed apparatus or method obvious, the prior art must enable one skilled in the art to make and use the apparatus or method.") Because Friemann does not enable an actuator as required by claim 1, it cannot support the obviousness rejection.[4]

[4] Friemann's lack of enablement is also significant to the other rejections made by the examiner. All of the examiner's rejections depend on the assumption that Friemann enables a brake capable of stopping a band cutter within 5 milliseconds. That assumption is incorrect, as explained, and therefore, all of the rejections should be reversed. This is one reason why the examiner's rejections should be reversed, but it is not the only reason. Other reasons are set forth in this brief.

2. The 3 millisecond limitation is more than a result-effective variable.

Even if Friemann enabled a brake actuated within 5 or 10 milliseconds, which it does not, an actuator as required by claim 1 still would not have been obvious because the 3 millisecond limitation is more than a result-effective variable having an optimum value. A result-effective variable is a variable used in a known process to obtain a recognized result, such as when determining an optimum concentration of elements within disclosed limits or a suitable temperature within a disclosed temperature range. See In re Peterson, 315 F.3d 1325, 1329-1330, 65 USPQ2d 1379 (Fed. Cir. 2003) (ranges of elements in a nickel-base single-crystal superalloy that were within known prior art ranges were like result-effective variables and therefore obvious); In re Yates, 663 F.2d 1054, 1056, 211 USPQ 1149 (CCPA 1981) (percentage degree of conversion of olefin to acid was not recognized in the art as a result-effective variable and therefore not obvious); Application of Boesch, 617 F.2d 272, 276, 205 USPQ 215 (CCPA 1980) (composition requirements of a nickel base alloy that overlapped with and were suggested by cited references were like result-effective variables and therefore obvious); Application of Antoine, 559 F.2d 618, 620, 195 USPQ 6 (CCPA 1977) (ratio of tank volume to contactor area in a wastewater treatment device was not recognized in the art as a result-effective variable and therefore not obvious).

The 3 millisecond limitation set forth in claim 1 is not recognized as a result-effective variable because it is not a variable used in a known process that may be optimized to achieve a recognized result. To the contrary, the 3 millisecond limitation is a specific characteristic of the recited actuator that, as far as applicant is aware, was never achieved in a woodworking machine prior to applicant's invention. Moreover,

none of the actuators or systems disclosed in the cited references could be optimized to meet that limitation, and there is no known process for optimizing actuator speed. In fact, none of the references even discuss such a limitation. Because the 3 millisecond limitation is not recognized as a result-effective variable, the basis for the examiner's rejection is incorrect and the obviousness rejection should be reversed.[5]

3. The cited references fail to disclose all claim limitations.

The examiner said Yoneda discloses "an actuator having stored energy sufficient to move the brake component (a capacitor that is charged to discharge to power the brake)." (Final Office Action mailed 10/4/05, p. 4.) That is incorrect. Yoneda does not disclose an actuator having stored energy as required by claim 1. The clamp brake in Yondea is actuated by energizing a wire winding 20' and the other brake in Yoneda is actuated by energizing a wire winding BR. (Yoneda, column 3, lines 1-5.) Those windings are energized by power supply 8 when relay contacts 5 are closed. Those two windings do not store energy; rather, electric current must flow through the windings to create the electromagnetic force used to operate the brakes. Moreover, Yoneda does not disclose a capacitor to power the brakes. The only capacitors disclosed by Yoneda are capacitors CP_1, CP_2 and CP_3. Capacitor CP_1 is a smoothing capacitor connected between outputs of an amplifier A to filter electrical noise. (Yoneda, column 2, lines 58-59.) Capacitor CP_2 is a capacitor connected between terminals in transformer Tr and to the negative terminal 3' of amplifier A. (Yoneda, column 2, lines 62-65.) Capacitor CP_3

[5] All of the examiner's rejections also depend on the assumption that a 3 millisecond limitation is a result-effective variable. Because that assumption is incorrect, all of the rejections should be reversed.

is another smoothing capacitor. (Yoneda, column 3, line 3.) Thus, Yoneda fails to disclose an actuator as set forth in applicant's claim 1.

The examiner apparently questioned whether Yoneda discloses an actuator with stored energy because he alternatively said that if Yoneda lacks the stored energy capacitor, then "Andreasson discloses that it is old and well known in the art to use stored energy braking mechanisms, that is, electromechanical brakes with charged capacitors." (Final Office Action mailed 10/4/05, p. 4.) Andreasson discloses "an arrangement for actuating a chain brake in a power chain saw." (Andreasson, column 1, lines 5-6.) Andreasson also discloses that '[t]he brake actuating device may be comprised of an electromagnet, energized by the current from a capacitor." (Andreasson, column 1, lines 34-36.)

First, applicant is unaware of any teaching in the cited references explaining how a capacitor as disclosed in Andreasson could power brakes as disclosed in Yoneda. To the contrary, Yoneda's brakes are powered by continuous electric current through wire coils, and it is doubtful that capacitors as disclosed in Andreasson could provide sufficient and continuous current. However, even if electromechanical brakes as disclosed in Yoneda could be triggered by capacitors as disclosed in Andreasson, the combination still would not constitute an actuator having stored energy sufficient to move a brake component into engagement with a cutting tool within 3 milliseconds as required by applicant's claim 1. That is because brakes like those used in the cited references have inertia that must be overcome and coils that must be energized before anything moves into engagement with the cutting tool, and charging coils and overcoming inertia requires more than 3 milliseconds. This is explained in the attached

declaration of Dr. David A. Turcic where he discusses the operation of motor brakes and electromechanical brakes. (Turcic Declaration, ¶21.) Thus, claim 1 cannot be obvious in light of the cited references because those references fail to disclose all claim limitations. See, e.g., 35 USC 103(a) (question is whether "the subject matter *as a whole* would have been obvious"); Application of Royka, 490 F.2d 981, 985 (CCPA 1974) (claim not obvious because limitation missing from cited references); Application of Wilson, 424 F.2d 1382, 1385 (CCPA 1970) ("All words in a claim must be considered in judging the patentability of that claim against the prior art."); MPEP 2143.03 ("To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art.")

4. There is no suggestion to combine the references.

The obviousness rejection of claim 1 also should be reversed because there is no teaching, suggestion or motivation in the prior art to make the proposed combination. Without such a teaching, suggestion or motivation, the obviousness rejection cannot stand. In re Rouffet, 149 F.3d 1350, 1355, 47 USPQ2d 1453 (Fed. Cir. 1998). Additionally, the suggestion to combine references "must be founded in the prior art, not in the applicant's disclosure." In re Vaeck, 947 F.2d 488, 493, 20 USPQ2d 1438 (Fed. Cir. 1991).

The examiner said the motivation to combine Yoneda and Friemann was "to prevent injury to the user," and the motivation to decrease Friemann's braking time from 5 to 3 milliseconds was "to prevent accidents." (Final Office Action mailed 10/4/06, p. 4.) That is the only motivation identified by the examiner to make the combination. However, the desire for safer products is not a sufficient motivation to combine

references. If it were, then almost no safety improvement could be patented because there is always a desire for safer products. Rather, there must be some specific understanding or technological principle in the prior art suggesting the specifically claimed combination. Expressed differently, it is not the desire to make something better but the solution that must be suggested or taught, and that suggestion must be clear and particular. This is explained by the case of In re Rouffet, 149 F.3d 1350, 1355, 47 USPQ2d 1453 (Fed. Cir. 1998).

In Rouffet the Board of Patent Appeals and Interferences affirmed the rejection of an application concerning a satellite communication system. The application addressed the problem of how to keep a receiver on the earth in communication with a satellite moving around the earth. Typically, a satellite transmits multiple signal beams to the earth and a receiver must switch from one beam to another as the satellite moves. This switching from beam to beam is referred to as a handover, and a disruption in communication is more likely during a handover. Rouffet minimized the number of handovers required by changing the shape of the transmitted beams from cones to fans. Fan-shaped beams have elliptical footprints that extend parallel to the direction of a satellite's motion. The elliptical footprints help ensure that a fixed point on the earth will remain within the satellite's beam. Id. at 1353.

The examiner rejected Rouffet's claims as obvious in light of a patent to King, a patent to Rosen, and a conference report by Ruddy. King disclosed a system to launch a plurality of low-orbit satellites. Rosen disclosed a geostationary satellite using fan-shaped beams oriented in an east-west direction. Ruddy disclosed a television broadcast system that transmitted a single fan-shaped beam upward from the earth into

which satellites would successively enter. This fan-shaped beam was oriented so its long axis was aligned with the long axes of the satellites' orbits. Id. at 1356. The Board affirmed the examiner's rejection and added an alternative rejection based on the combination of two other patents. Rouffet then appealed to the Federal Circuit.

On appeal, the Federal Circuit found no error in the Board's conclusion that "the combination of King, Rosen, and Ruddy contains all of the elements claimed in Rouffet's application." Id. at 1357. Nevertheless, the Federal Circuit concluded "the Board reversibly erred in determining that one of skill in the art would have been motivated to combine these references in a manner that rendered the claimed invention obvious." Id. The Federal Circuit said the Board erred by failing to identify any specific understanding or scientific principle suggesting the combination. The court explained that an examiner cannot simply find claim elements in the prior art and then combine them to arrive at the invention because such an approach would allow hindsight to influence the determination. Rather, an examiner must find the claim elements in the prior art and then specify how the prior art suggests or motivates the combination of those elements. This is explained in the following discussion from Rouffet:

> As this court has stated, "virtually all [inventions] are combinations of old elements." *Environmental Designs, Ltd. V. Union Oil Co.*, 713 F.2d 693, 698, 218 U.S.P.Q. 865, 870 (Fed. Cir. 1983); *see also Richdel, Inc. v. Sunspool Corp.*, 714 F.2d 1573, 1579-80, 219 U.S.P.Q. 8, 12 (Fed. Cir. 1983) ("Most, if not all, inventions are combinations and mostly of old elements.") Therefore an examiner may often find every element of a claimed invention in the prior art. If identification of each claimed element in the prior art were sufficient to negate patentability, very few patents would ever issue. Furthermore, rejecting patents solely by finding prior art corollaries for the claimed elements would permit an examiner to use the claimed invention itself as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention. Such an approach would be "an illogical and

inappropriate process by which to determine patentability." *Sensonics, Inc. v. Aerosonic Corp.*, 81 F.3d 1566, 1570, 38 U.S.P.Q.2d 1551, 1554 (Fed. Cir. 1996).

To prevent the use of hindsight based on the invention to defeat patentability of the invention, this court requires the examiner to show a motivation to combine the references that create the case of obviousness. In other words, the examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed.

This court has identified three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art. In this case, the Board relied upon none of these. Rather, just as it relied on the high level of skill in the art to overcome the differences between the claimed invention and the selected elements in the references, it relied upon the high level of skill in the art to provide the necessary motivation. The Board did not, however, explain what specific understanding or technological principle within the knowledge of one of ordinary skill in the art would have suggested the combination. Instead, the Board merely invoked the high level of skill in the field of art. If such a rote invocation could suffice to supply a motivation to combine, the more sophisticated scientific fields would rarely, if ever, experience a patentable technical advance. Instead, in complex scientific fields, the Board could routinely identify the prior art elements in an application, invoke the lofty level of skill, and rest its case for rejection. To counter this potential weakness in the obviousness construct, the suggestion to combine requirement stands as a critical safeguard against hindsight analysis and rote application of the legal test for obviousness.

Because the Board did not explain the specific understanding or principle within the knowledge of a skilled artisan that would motivate one with no knowledge of Rouffet's invention to make the combination, this court infers that the examiner selected these references with the assistance of hindsight. This court forbids the use of hindsight in the selection of references that comprise the case of obviousness. *See In re Gorman,* 933 F.2d 982, 986, 18 U.S.P.Q.2d 1885, 1888 (Fed.Cir.1991). Lacking a motivation to combine references, the Board did not show a proper *prima facie* case of obviousness. This court reverses the rejection over the combination of King, Rosen, and Ruddy. (Rouffet, 149 F.3d at 1357-1358.)

This discussion is pertinent to the case at hand because the examiner in the present application did not identify any specific understanding or technological principle that would motivate a person of ordinary skill to think the actuation time of Friemann's system could be reduced to 3 milliseconds, and to then incorporate that improved system in Yoneda, just as the examiner in Rouffet failed to identify any such understanding or principle. The examiner's motivation "to prevent injury" is simply a rote invocation of the desire for safer products used to justify the combination of references, just as the reliance on a high level of skill was a rote invocation used to justify the combination of references in Rouffet. As explained by the Federal Circuit, such rote invocations cannot provide the required motivation because then there would rarely be any patentable technical advance. Instead, a specific suggestion to make a combination is required, and that requirement must be diligently applied because, as the Federal Circuit has said, "invention itself is the process of combining prior art in a nonobvious manner." Id. at 1359. In the case at hand, the examiner failed to identify any specific suggestion to make the combination.

Another case explaining the requirement of a specific suggestion to combine references is In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999) (citations omitted), *abrogated on other grounds* in In re Gartside, 203 F.3d 1305, 53 USPQ2d 1769 (Fed. Cir. 2000). In that case the Board of Patent Appeals and Interferences affirmed the rejection of an application concerning a trash bag made to look like a jack-o'-lantern when filled with leaves or trash. The application was rejected in light of conventional plastic trash bags combined with orange crepe paper jack-o'-lanterns (referred to as the Holiday reference) and paper bag pumpkins (referred to as

the Shapiro reference). The Federal Circuit reversed the rejection because the Board did not identify a suggestion to make the combination. The Federal Circuit explained,

> [R]ather than pointing to specific information in Holiday or Shapiro that suggest the combination with the conventional bags, the Board instead described in detail the similarities between the Holiday and Shapiro references and the claimed invention, noting that one reference or the other – in combination with each other and the conventional trash bags – described all of the limitations of the pending claims. ... Nowhere does the Board particularly identify any suggestion, teaching, or motivation to combine the children's art references (Holiday and Shapiro) with the conventional trash or lawn bag references, nor does the Board make specific -- or even inferential -- findings concerning the identification of the relevant art, the level of ordinary skill in the art, the nature of the problem to be solved, or any other factual findings that might serve to support a proper obviousness analysis. ...
>
> ...Yet this reference-by-reference, limitation-by-limitation analysis fails to demonstrate how the Holiday and Shapiro references teach or suggest their combination with the conventional trash or lawn bags to yield the claimed invention. ... Because we do not discern any finding by the Board that there was a suggestion, teaching, or motivation to combine the prior art references cited against the pending claims, the Board's conclusion of obviousness, as a matter of law, cannot stand. (Dembiczak, 175 F.3d at 1000.)

Just as in Dembiczak, the examiner in the case at hand simply found what he thought were the elements of applicant's claim and then combined those elements according to applicant's teachings without identifying any specific suggestion in the prior art to make the combination. As explained in Dembiczak, that type of analysis cannot support a conclusion of obviousness. The Federal Circuit clearly stated: "Combining prior art references without evidence of such a suggestion, teaching, or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability – the essence of hindsight." Id. at 999. In the case at hand, just as in Dembiczak, the examiner "fell into the hindsight trap." Id.

B. Claim 19.

Claim 19 was rejected under 35 USC 103(a) as obvious in light of Yoneda combined with Andreasson and Friemann. Claim 19 describes a woodworking machine having a cutting tool, means for detecting a dangerous condition between a person and the cutting tool, a brake component spaced apart from the cutting tool, and "means for moving the brake component into contact with the cutting tool within 3 milliseconds or less after the dangerous condition is detected." The "means for moving" limitation is a means-plus-function limitation that must be interpreted to cover the corresponding structure, material or acts described in the specification and equivalents thereof. 35 USC 112 (6th paragraph). The structure, material or acts described in the specification as corresponding to that recited function include biasing mechanism 30 shown schematically in Figure 1, spring 66 shown in Figures 2 and 3, the various springs shown in Figures 4-14, 16-19 and 21, and the various actuators discussed throughout the specification and shown in Figures 8-21. The cited references do not disclose any spring, actuator or other structure as disclosed in applicant's specification, or equivalents thereof. Therefore, claim 19 is not obvious in light of the cited references. Additionally, claim 19 is not obvious for the reasons given above concerning claim 1.

C. Claim 31.

Claim 31 was also rejected under 35 USC 103(a) as obvious in light of Yoneda combined with Andreasson and Friemann. Claim 31 describes a woodworking machine having a cutting tool, a detection system adapted to detect a dangerous condition between a person and the cutting tool, a moveable component adapted to move to mitigate or prevent injury to the person, and "an actuator having stored energy sufficient

to start moving the moveable component within 3 milliseconds after the dangerous condition is detected." The cited references do not disclose such an actuator, and there is no suggestion to combine the references, for the reasons given above concerning claim 1. Therefore, claim 31 is not obvious in light of the cited references.

II. Claims 3 and 4 in light of Yoneda, Andreasson, Friemann, Baur and Bielinski.

Claims 3 and 4 were rejected under 35 U.S.C. 103(a) as obvious over Yoneda combined with Andreasson and Friemann as described above, and further in view of Baur (US Patent 3,695,116) and Bielinski (US Patent 5,606,889). Claim 3 depends from claim 1 and further states that "the actuator includes a spring adapted to move the brake component into engagement with the cutting tool within approximately 3 milliseconds or less." Claim 4 depends from claim 3 and further requires "a housing removably coupled to the frame, where the spring and the brake component are mounted within the housing." The examiner says Yoneda, Andreasson and Friemann disclose the invention as claimed except for a spring and housing. The examiner cites Baur as showing a spring loaded actuator and Bielinski as showing actuators in what the examiner calls "removable cartridges." The examiner then combines the references to reject the claims.

The Board should reverse this rejection for the same reasons given above concerning claim 1. The Board also should reverse this rejection because 1) Baur and Bielinski are non-analogous art, 2) Bielinski does not show a housing as required by claim 4, 3) there is no reasonable expectation that the combination of Yoneda, Andreasson, Friemann, Baur and Bielinski would work, and 4) there is no suggestion to combine the references. These points are explained below.

1. Baur and Bielinski are non-analogous art.

The first step in an obviousness analysis is to identify the scope and content of the prior art. Graham v. John Deere Co., 383 U.S. 1, 17, 86 S.Ct. 684, 693-94, 15 L.Ed.2d 545, 148 USPQ 459, 467 (1966). In other words, one must determine what art may be considered. Art that may be considered is called "analogous" while art that may not be considered is called "non-analogous." See In re Clay, 966 F.2d 656, 658, 23 USPQ2d 1058 (Fed. Cir. 1992). Whether a reference is analogous is a question of fact. Id.

The Federal Circuit has identified two criteria for determining whether a reference is analogous. The first is whether the reference is from the same field of endeavor as applicant's invention. If it is, then the reference is analogous. If it is not, then the second criterion must be considered. The second criterion is whether the reference is reasonably pertinent to the particular problem addressed by the inventor. Id. at 658-659.

The Federal Circuit applied these criteria in the case of In re Clay, 966 F.2d 656, 658, 23 USPQ2d 1058 (Fed. Cir. 1992). In that case, the Federal Circuit reversed a rejection of claims to a process for storing liquid hydrocarbon in a tank having a dead volume between the bottom of the tank and its outlet. Id. at 657. The process included the step of placing gel in the dead volume. The claims were rejected in light of two references: Hetherington, which disclosed a petroleum storage tank that used bladders to fill the dead space at the bottom of the tank, and Sydansk, which taught using gel to fill anomalies in underground petroleum formations. Clay argued that Sydansk should not be considered because it was non-analogous art. The Board of Patent Appeals and Interferences, however, ruled that Sydansk was in the same field of endeavor, and

therefore analogous, because the gel disclosed in Sydansk "would have a number of applications within the manipulation of the storage and processing of hydrocarbon liquids ... [and that] the gel as taught in Sydansk would be expected to function in a similar manner as the bladders in the Hetherington patent." Id. at 659.

Clay then appealed to the Federal Circuit. The first question addressed by the Federal Circuit was whether Sydansk was in the same field of endeavor as Clay. The court ruled that it was not, saying: "Sydansk cannot be considered to be within Clay's field of endeavor merely because both relate to the petroleum industry." Id. The court explained that Sydansk dealt with underground formations while Clay dealt with man-made storage tanks, and Sydansk's invention operated at high temperatures and pressures while Clay's invention operated at ambient temperature and atmospheric pressure. Because of these differences, the court ruled that the two references were from different fields of endeavor: "Clay's field of endeavor is the *storage* of refined liquid hydrocarbons. The field of endeavor of Sydansk's invention, on the other hand is the *extraction* of crude petroleum. The Board clearly erred in considering Sydansk to be within the same field of endeavor as Clay's." Id. (emphasis in original).

The Federal Circuit then considered the second criterion, whether Sydansk was reasonably pertinent to the problem addressed by Clay, and stated:

> A reference is reasonably pertinent if, even though it may be in a different field from that of the inventor's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem. Thus, the purposes of both the invention and the prior art are important in determining whether the reference is reasonably pertinent to the problem the invention attempts to solve. If a reference disclosure has the same purpose as the claimed invention, the reference relates to the same problem, and that fact supports use of that reference in an

> obviousness rejection. An inventor may well have been motivated to consider the reference when making his invention. If it is directed to a different purpose, the inventor would accordingly have had less motivation or occasion to consider it. (Id. at 659)

The Federal Circuit applied that standard and explained that the purpose of Clay's invention was to displace liquid from dead spaces in a storage tank while the purpose of Sydansk's invention was to recover oil from rock. The court also explained that a subterranean formation "is not structurally similar to, does not operate under the same temperature and pressure as, and does not function like Clay's storage tanks." Id. at 660. Because of these differences the court concluded that Sydansk was not reasonably pertinent to the problem addressed by Clay, and therefore, Sydansk was non-analogous and should not have been considered.

The situation in Clay is similar to the case at hand. Applicant's field of endeavor is safety systems for woodworking machines while Baur and Bielinski disclose actuators. (Baur, column 1, lines 5-7, Bielinski, column 1, lines 7-10.) Specifically, Baur shows an actuator made from a "collapsible dual piston assembly." (Baur, column 1, lines 50-51.) The pistons are prevented from collapsing by a pair of shear pins. The shear pins are made from a heat-ignitable material so that when they ignite, they release the pistons and allow them to collapse. (Baur, column 1, lines 51-68.) Bielinski discloses an actuator with spool halves that fit around a shaft and restrict the shaft from moving. The spool halves are held together by a coil and wire link. The link breaks when sufficient electric current passes through it and the spool halves then separate to release the shaft. (Bielinski, column 1, lines 50-67.)

Clearly, safety systems for woodworking machines and actuators address different issues, operate under different principles, serve different purposes, and are constructed differently. These differences are greater than the differences between storing and extracting petroleum described in Clay, and they show that applicant's invention is from a different field of endeavor than Baur and Bielinski. Thus, the question becomes whether Baur and Bielinski are reasonably pertinent to the problem addressed by applicant.

Baur and Bielinski are not reasonably pertinent to the problem addressed by applicant because an inventor considering how to make a woodworking machine safer would not look to actuators to solve that problem. Actuators by themselves do not suggest safety systems, and safety systems do not bring to mind actuators. It is only after an inventor conceives of a safety system, and determines that the system requires an actuator, that actuators would become of interest. But that is after the solution to the problem has been conceived, or in other words, after an inventive step has occurred. And even then, not all actuators would be of interest because many actuators would not work with the invented solution.

In Clay, the Federal Circuit ruled that a person considering how to make petroleum storage tanks would not look to petroleum extraction methods because of differences in purpose, structure, and operation, even though the invented petroleum storage tanks and the prior art petroleum extraction method both used gel to fill dead spaces. The Federal Circuit explained: "A person having ordinary skill in the art would not reasonably have expected to solve the problem of dead volume in tanks for storing refined petroleum by considering a reference dealing with plugging underground

formation anomalies." In re Clay, 966 F.2d at 660. Similarly, in the case at hand, a person considering how to make woodworking machines safer would not reasonably have expected to solve the problem by considering actuators because of differences in purpose, structure and operation, even though the invented solution may end up using an actuator. Again, actuators themselves do not suggest a solution to the problem of woodworking machine safety, and as a result, they are non-analogous art. See also, In re Oetiker, 977 F.2d 1443, 1447, 24 USPQ2d 1443 (Fed. Cir. 1992) (garment fasteners were non-analogous to a fastener for hose clamps); In re Pagliaro, 657 F.2d 1219, 1224-1225, 210 USPQ 888 (CCPA 1981) (reference concerning the solubility of caffeine in oil was non-analogous to a process of decaffeinating vegetable materials for beverages).

2. Bielinski does not show a housing as required by claim 4.

Claim 4 depends from claim 3, which in turn depends from claim 1. Thus, claim 4 describes a woodworking machine with a brake component, an actuator with "a spring adapted to move the brake component into engagement with the cutting tool within approximately 3 milliseconds or less," and "a housing removably coupled to the frame, where the spring and the brake component are mounted within the housing." The examiner says: "Bielinski discloses that it is old and well known in the art to use spring loaded actuators that use fusible members are [sic] contained in replaceable/removable cartridges for the purpose of facilitating efficiency of the operation of the device thereby allowing the user to quickly and easily replace used cartridges with new ones." (Final Office Action mailed 10/4/05, p. 5.) That is incorrect. Bielinski does not show a spring loaded actuator contained in a cartridge. The only "cartridge" mentioned in Bielinski is

cartridge assembly 62 identified in Figure 5 of Bielinski. That cartridge assembly is not a housing - it is a body of an electrically insulating material with an outer surface conforming to a cutout portion of the spool. (Bielinski, column 2, line 65 through column 3, line 1.) Bielinski simply does not show any type of housing as required by claim 4, so claim 4 is not obvious in light of that reference. See, e.g., 35 USC 103(a) (question is whether "the subject matter *as a whole* would have been obvious"); Application of Royka, 490 F.2d 981, 985 (CCPA 1974) (claim not obvious because limitation missing from cited references); Application of Wilson, 424 F.2d 1382, 1385 (CCPA 1970) ("All words in a claim must be considered in judging the patentability of that claim against the prior art."); MPEP 2143.03 ("To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art.")

3. There is no reasonable expectation that the combination of Yoneda, Andreasson, Friemann, Baur and Bielinski would succeed.

The obviousness rejection of claims 3 and 4 also should be reversed because there is no reasonable expectation that a band cutter as disclosed in Yoneda could be successfully modified to include Andreasson's capacitors, Friemann's modified brake system, Baur's springs and Bielinski's alleged housing. The obviousness rejection cannot stand without that reasonable expectation. In re Dow Chemical Co., 837 F.2d 469, 473, 5 USPQ2d (Fed. Cir. 1988) ("The consistent criterion for determination of obviousness is whether the prior art would have suggested to one of ordinary skill in the art that this process should be carried out and would have a reasonable likelihood of success, viewed in the light of the prior art."); see also MPEP 2143.02 ("Reasonable Expectation of Success Is Required").

There are numerous reasons why there is no reasonable expectation that the combination proposed by the examiner would succeed. One reason is that Friemann fails to enable an actuator having stored energy sufficient to move a brake component into engagement with a cutting tool within 3 milliseconds after a dangerous condition is detected, as explained above. Another reason is that capacitors as disclosed in Andreasson do not supply continuous electric current required to operate electromechanical brakes as disclosed in Yoneda and Friemann. Similarly, the springs disclosed in Baur do not apply a continuous electrical current to power electromechanical brakes. In fact, Baur discloses a mechanical actuator while the brakes disclosed in Yoneda and Friemann are triggered electrically. Finally, Bielinski does not disclose a housing, as explained above. These are all reasons why there is no reasonable expectation that the proposed combination would succeed.

Moreover, there is no teaching in any cited reference explaining how to combine the references as suggested by the examiner. This is significant because, in order to support an obviousness rejection, the cited references "must provide an enabling disclosure, i.e., [it] must place the claimed invention in the possession of the public. ... An invention is not 'possessed' absent some known or obvious way to make it." <u>In re Payne</u>, 606 F.2d 303, 314, 203 USPQ 245, 255 (CCPA 1979) (citations omitted); <u>see also</u> <u>In re Kumar</u>, 418 F.3d 1361, 1369, 76 USPQ2d 1048 (Fed. Cir. 2005) ("To render a later invention unpatentable for obviousness, the prior art must enable a person of ordinary skill in the field to make and use the later invention."); <u>Motorola, Inc. v. Interdigital Technology Corp.</u>, 121 F.3d 1461, 1471, 43 USPQ2d 1481 (Fed. Cir. 1997) (district court correctly instructed the jury that prior art must be enabling to invalidate

claims as obvious); Beckman Instruments, Inc. v. LKB Produkter AB, 892 F.2d 1547, 1551, 13 USPQ2d 1301, 1304 (Fed. Cir. 1989) ("In order to render a claimed apparatus or method obvious, the prior art must enable one skilled in the art to make and use the apparatus or method.")

4. There is no teaching, suggestion or motivation to make the combination.

The obviousness rejection of claims 3 and 4 also should be reversed because there is no teaching, suggestion or motivation in the prior art to make the proposed combination. The only motivation given by the examiner is the following:

> Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made [sic] to a removable housing comprising springs, brakes, and fusible members that enable actuation of a braking mechanism by a spring actuator in order to provide a fast acting, less expensive, smaller actuator that facilitates efficiency of the operation as taught by Baur and Bielinski, and such that the effectiveness of the braking system is maintained. (Final Office Action mailed 10/4/05, p. 6.)[6]

Applicant is unaware of any teaching or suggestion in the cited references supporting that statement. In fact, the opposite conclusion seems likely. For example, the construction of Baur's and Bielinski's actuators is more complicated and therefore likely to be more expensive than the standard wire coils or solenoids used to trigger the brakes disclosed in Yoneda and Friemann. This is especially true over the long term because Baur's and Bielinski's actuators are single-use actuators that would have to be replaced after each use. Baur's and Bielinski's actuators would also be additional to, not a replacement for, the wire coils or solenoids of Yoneda and Friemann because those

[6] The examiner's reference to fusible members is irrelevant because the claims at issue do not recite fusible members. Applicant filed a separate application focusing on the use of fusible members to trigger reaction systems, and the examiner's statement may have been copied from that other application.

actuators cannot supply the electromagnetic force required to operate the brakes of Yoneda and Friemann. Adding Baur's and Bielinski's actuators would also likely result in a larger and slower overall system given the fact that those actuators require additional structure in order to trigger some action, and given the fact that those actuators are additional to, not replacements for, the coils of Yoneda and Friemann. Thus, the examiner's statement that the proffered combination would result in a faster, cheaper, smaller and more efficient system is unsupported.

Additionally, the combination suggested by the examiner would require a substantial reconstruction and change the principle of operation of the band cutter disclosed in Yoneda, which shows that there is no suggestion to make the combination. This is explained by the case of In re Ratti, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). In that case, claims directed to an oil seal comprising a bore engaging portion with a resilient sealing member were rejected as obvious in light of a combination of references, including a primary reference with a more rigid seal. The court reversed the rejection, explaining that the "suggested combination of references would require a substantial reconstruction and redesign of the elements shown in [the primary reference] as well as a change in the basic principle under which the [primary reference] construction was designed to operate." Id. at 813, 123 USPQ at 352.

Ratti is analogous to the case at hand because the proposed combination of Yoneda, Andreasson, Friemann, Baur and Bielinski would require a substantial reconstruction of the band cutter disclosed in Yoneda. Somehow the capacitors of Andreasson, the modified brake system of Friemann, the springs of Baur and the imagined housing of Bielinski would all have to be incorporated into Yoneda's band

cutter. Additionally, that combination would change the basic principle of operation of Yoneda's band cutter because it operates on the principle that the brake system may be operated repeatedly. If the brake system were somehow modified to include Baur's springs, then the resulting brake system would no longer be capable of repeated actuations. Instead, the brake system could trigger only once and then the actuator would have to be replaced.

It is important to understand that the mere existence in the prior art of the various limitations recited in a patent claim does not mean it would have been obvious to combine those limitations as set forth in the claim. There must be some clear and specific suggestion to make the combination; otherwise the combination is not obvious. In re Rouffet, 149 F.3d 1350, 1355, 47 USPQ2d 1453 (Fed. Cir. 1998); In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999) (citations omitted), *abrogated on other grounds* in In re Gartside, 203 F.3d 1305, 53 USPQ2d 1769 (Fed. Cir. 2000). In the case at hand, the examiner did not identify any clear and specific suggestion found in the prior art, and therefore, claims 3 and 4 are not obvious.

III. Claim 19 in light of Yoneda and Friemann.

Claim 19 was also rejected under 35 USC 103(a) as obvious in light of Yoneda combined with Friemann. That rejection should be reversed for the same reasons discussed above concerning the rejection of claims based on Yoneda, Andreasson and Friemann.

Obviousness-Type Double Patenting

IV. Claim 19 in light of application 10/100,211 combined with Friemann.

Claim 19 was provisionally rejected under the judicially created doctrine of obviousness-type double patenting in light of claims 1, 17 and 19-28 of co-pending application 10/100,211. The rejection is provisional because the co-pending claims have not issued. In fact, the co-pending claims have been finally rejected and that rejection has been appealed (an appeal brief has been filed). Additionally, co-pending claims 20 and 28 have been cancelled without prejudice, so the rejection based on those claims is moot.

The purpose of an obviousness-type double patenting rejection is "to prevent the extension of the term of a patent, even where an express statutory basis for the rejection is missing, by prohibiting the issuance of the claims in a second patent not patentably distinct from the claims of the first patent." In re Longi, 759 F.2d 887, 892, 225 USPQ 645 (Fed. Cir. 1985). The policy behind the rejection is as follows:

> The public should ... be able to act on the assumption that upon expiration of the patent it will be free to use not only the invention claimed in the patent but also modifications or variants thereof which would have been obvious to those of ordinary skill in the art at the time the invention was made, taking into account the skill of the art and prior art other than the invention claimed in the issued patent." In re Zickendraht, 319 F.2d 225, 232, 138 USPQ 23, 27 (CCPA 1963) (Rich, J., concurring).

The test to determine the propriety of an obviousness-type double patenting rejection is "whether the claimed invention in the application for the second patent would have been obvious from the subject matter of the claims in the first patent, in light of the prior art." Longi, 759 F.2d at 893 (citing Carman Industries Inc. v. Wahl, 724 F.2d 932,

940, 220 USPQ 481, 487 (Fed. Cir. 1983). Standard guidelines for an obviousness analysis are relevant to this test. Longi, 759 at 892 n.4.

In applying this test, one compares what is *claimed* by the two patent applications, not what is *disclosed*. General Foods Corp. v. Studiengesellschaft Kohle mbH, 972 F.2d 1272, 1280-1281, 23 USPQ2d 1839 (Fed. Cir. 1982). The Federal Circuit has stated: "Our precedent makes clear that the *disclosure* of a patent cited in support of a double patenting rejection cannot be used as though it were prior art, *even where the disclosure is found in the claims*." Id. at 1281 (citations omitted, emphasis in original). In other words, "[d]ouble patenting is altogether a matter of what is claimed," and "[c]laims must be read as a whole in analyzing a claim of double patenting." Id. at 1277-1278. In short, "the determining factor in deciding whether or not there is double patenting is the existence vel non of *patentable difference* between two sets of claims." Id. at 1278-1279.

Applying these standards to the claims at issue shows there is no double patenting because the claims define different, non-obvious inventions. Claim 19 in the present application describes a woodworking machine with a cutting tool, means for detecting a dangerous condition between a person and the cutting tool, and a brake component spaced apart from the cutting tool. Claim 19 also requires "means for moving the brake component into contact with the cutting tool within 3 milliseconds or less after the dangerous condition is detected." The cited co-pending claims do not describe any such means. Instead, they describe woodworking machines with a cutting

tool and "a brake mechanism adapted to stop at least one motion of the cutting tool within 10 milliseconds after detection of the unsafe condition."[7]

---

[7] The cited co-pending claims are:

1. A machine comprising:

an operative structure adapted to perform a task, where the operative structure includes a mechanical cutting tool adapted to move in at least one motion; and

a safety system adapted to detect the occurrence of an unsafe condition between a person and the cutting tool, where the safety system includes a detection subsystem adapted to detect the unsafe condition, and a reaction subsystem adapted to mitigate the unsafe condition;

where the reaction subsystem includes a brake mechanism adapted to stop at least one motion of the cutting tool within 10 milliseconds after detection of the unsafe condition.

17. The machine of claim 1 where the machine is a table saw, where the mechanical cutting tool is a circular blade, and where the operative structure includes a table with an opening through which at least part of the circular blade can extend.

19. The machine of claim 1 where the machine is a miter saw, where the mechanical cutting tool is a circular blade, where the operative structure includes a base defining a cutting zone, a pivot arm attached to the base to pivot toward and away from the cutting zone, and a motor to drive the blade, and where the blade is supported by the pivot arm.

21. The machine of claim 1 where the machine is a radial arm saw, where the mechanical cutting tool is a circular blade, and where the operative structure includes a base, a guide arm, and a carriage slidably coupled to the guide arm.

22. The machine of claim 1 where brake mechanism is adapted to stop at least one motion of the cutting tool within 7 milliseconds after detection of the unsafe condition.

23. The machine of claim 1 where the brake mechanism is adapted to stop at least one motion of the cutting tool within 5 milliseconds after detection of the unsafe condition.

24. The machine of claim 1 where the mechanical cutting tool is adapted to rotate and where the brake mechanism is adapted to stop that rotation.

25. The machine of claim 24 where the brake mechanism is adapted to stop the rotation of the mechanical cutting tool within 7 milliseconds after detection of the unsafe condition.

26. The machine of claim 1 where the operative structure defines a work zone, where the mechanical cutting tool is adapted to move into the cutting zone to make a cut, and where brake mechanism is adapted to stop that motion into the cutting zone.

27. The machine of claim 26 where the brake mechanism is adapted to stop the motion of the cutting tool into the cutting zone within 7 milliseconds after detection of the unsafe condition.

The examiner recognized that the cited co-pending claims do not disclose the limitation of "means for moving the brake component into contact with the cutting tool within 3 milliseconds or less after the dangerous condition is detected," but he says that limitation is obvious in light of Friemann. (Final Office Action mailed 10/4/05, pp. 2-3.) The examiner's conclusion is incorrect and this double-patenting rejection should be reversed for the reasons given above explaining why Friemann is not enabled. As explained, it is a significant and difficult issue to move a brake component within 3 milliseconds and Friemann does not enable any system capable of doing it.

8. Claims appendix.

1. A woodworking machine comprising:

a support frame;

a motor supported by the frame;

a cutting tool supported by the frame and moveable by the motor;

a detection system adapted to detect a dangerous condition between a person and the cutting tool;

a brake component adapted to engage the cutting tool, where the brake component has a ready position spaced apart from the cutting tool; and

an actuator having stored energy sufficient to move the brake component from the ready position into engagement with the cutting tool within approximately 3 milliseconds or less after the dangerous condition is detected.

2. (cancelled).

3. The machine of claim 1, where the actuator includes a spring adapted to move the brake component into engagement with the cutting tool within approximately 3 milliseconds or less.

4. The machine of claim 3, further comprising a housing removably coupled to the frame, where the spring and the brake component are mounted within the housing.

5. (cancelled).

6. (withdrawn) The machine of claim 1, where the spacing between the brake component and the cutting tool is at least 1/8-inch when the brake component is in the ready position.

7. (withdrawn) The machine of claim 1, where the spacing between the brake component and the cutting tool is at least 1/4-inch when the brake component is in the ready position.

8. (cancelled).

9. (withdrawn) The machine of claim 1, where the actuator is adapted to move the brake at an acceleration of over 500 ft/s2 when the detection system detects the dangerous condition.

10. (withdrawn) The machine of claim 1, where the actuator is adapted to move the brake at an acceleration of over 2000 ft/s2 when the detection system detects the dangerous condition.

11. (withdrawn) The machine of claim 9, where the actuator includes one or more springs adapted to move the brake into contact with the blade.

12. (withdrawn) The machine of claim 11, where the one or more springs are adapted to apply at least 50 lbs. of force to move the brake into contact with the blade.

13-18. (cancelled).

19. A woodworking machine, comprising:

a cutting tool adapted to cut workpieces;

means for driving the cutting tool;

means for detecting a dangerous condition between a person and the cutting tool;

a brake component spaced apart from the cutting tool; and

means for moving the brake component into contact with the cutting tool within 3 milliseconds or less after the dangerous condition is detected.

20. (cancelled).

21. (withdrawn) The machine of claim 1, wherein the cutting tool includes a circular blade having an outer perimeter, and further wherein the brake component is adapted to engage the outer perimeter of the circular blade.

22. (withdrawn) The machine of claim 21, wherein the machine is a table saw.

23. (withdrawn) The machine of claim 21, wherein the brake component is adapted to be pivoted into engagement with the outer perimeter of the circular blade.

24. (withdrawn) The machine of claim 21, wherein the brake component is adapted to be slid into engagement with the outer perimeter of the circular blade.

25. (withdrawn) The machine of claim 21, wherein the brake component is adapted to be rotated into engagement with the outer perimeter of the circular blade.

26. (withdrawn) The machine of claim 21, wherein at least a portion of the brake component is destroyed when the brake component engages the circular blade.

27. (withdrawn) The machine of claim 1, wherein the brake component is adapted to be pivoted into engagement with the cutting tool.

28. (withdrawn) The machine of claim 1, wherein the brake component is adapted to be slid into engagement with the cutting tool.

29. (withdrawn) The machine of claim 1, wherein the brake component is adapted to be rotated into engagement with the cutting tool.

30. (withdrawn) The machine of claim 1, wherein at least a portion of the brake component is destroyed when the brake component engages the cutting tool.

31. A woodworking machine comprising:

a support frame;

a motor supported by the frame;

a cutting tool supported by the frame and moveable by the motor;

a detection system adapted to detect a dangerous condition between a person and the cutting tool;

a mechanism having a moveable component adapted to move upon detection of the dangerous condition by the detection system, where movement of the moveable component contributes to the mitigation or prevention of injury to the person, and

an actuator having stored energy sufficient to start moving the moveable component within 3 milliseconds after the dangerous condition is detected.

9. Evidence appendix.

Evidence submitted during prosecution of the application pursuant to 37 C.F.R. 1.132 includes a declaration of Dr. David A. Turcic with exhibits. Appellant relies on this evidence in this appeal. The original, signed copy of the declaration was received by the Patent Office on June 22, 2005 and was entered in the record on that date. A copy of the declaration is attached.

10. Related proceedings appendix.

None.

Respectfully submitted,

SD3, LLC

David A. Fanning, Esq.
Registration No. 33,233
Customer No. 27630
25977 S.W. Canyon Creek Road, Suite G
Wilsonville, Oregon 97070
Telephone: (503) 570-3200
Facsimile: (503) 570-3303

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this Appeal Brief is being deposited with the U.S. Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, or facsimile transmitted to the U.S. Patent and Trademark Office to number (571) 273-8300, on the date shown below.

Date: March 3, 2006

David A. Fanning

06/22/2005 10:38 5036388601 SAWSTOP LLC PAGE 33/65

Attachment 2
Turcic Declaration with Exhibits

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

STEPHEN F. GASS

Serial No.: 10/100,211 Examiner Boyer D. Ashley

Filed: March 13, 2002 Group Art Unit 3724

For: SAFETY SYSTEMS FOR POWER EQUIPMENT

To: Commissioner for Patents
Attention: Examiner Boyer D. Ashley
Group Art Unit 3724
P.O. Box 1450
Alexandria, Virginia 22313-1450

DECLARATION OF DR. DAVID A. TURCIC

I, David A. Turcic, declare as follows:

1. I am an Associate Professor of Mechanical Engineering at Portland State University in Portland, Oregon. I have worked as an Associate Professor at Portland State University since 1992 and I received tenure in 1994. I have also taught mechanical engineering at Pennsylvania State University, Drexel University, and the University of Wisconsin, Madison where I was also a tenured associate professor.

2. I earned a Ph.D. degree in mechanical engineering from Pennsylvania State University in 1982. I had previously earned masters and bachelor degrees in mechanical engineering from Pennsylvania State University.

3. A copy of my resume is attached as exhibit 1.

4. I have also been a woodworker for many years and I am familiar with the construction and operation of band saws and table saws. I personally own a table saw and a band saw.

5. I understand that the above-identified patent application titled "Safety Systems for Power Equipment" is currently pending before the U.S. Patent and Trademark Office. I also understand that the application includes claims 1 and 22-24 that describe various machines with a mechanical cutting tool and a safety system adapted to detect an unsafe condition between a person and the cutting tool. The safety system includes a detection subsystem to detect the unsafe condition and a reaction subsystem to mitigate the unsafe condition. The reaction subsystem includes "a brake mechanism adapted to stop at least one motion of the cutting tool within 10 milliseconds after detection of the unsafe condition."

6. I am aware that claims 1 and 22-24 from the above-identified application have been rejected as anticipated by U.S. Patent No. 3,858,095 to Friemann et al. I have read and studied a communication from the Patent Office mailed February 8, 2005 setting forth the bases for that rejection. In support of that rejection, the Patent Office said the Friemann patent discloses a band cutter machine with a band cutter and a brake system that can stop the movement of the band cutter within 10 milliseconds after detecting contact between a person and the cutter. I am also aware that the Friemann patent itself says it is possible to stop the band cutter within 5 or 10 milliseconds using the circuits and brake systems disclosed in the patent.

7. I have been retained to offer an independent expert opinion as to whether the Friemann patent discloses a brake system capable of stopping the movement of the band cutter within 10 milliseconds after detecting contact between a person and the cutter, and whether the Friemann patent discloses such a brake system sufficiently for an ordinary mechanical engineer to make one.

8. I have read and studied the Friemann patent and I understand its disclosure. In my opinion, the brake systems disclosed in the Friemann patent cannot stop the band cutter within 10 milliseconds after detecting contact between a person and the cutter and Friemann fails to teach or suggest any way to make such a brake system. Based on the disclosure in the Friemann patent combined with my knowledge of mechanical engineering, I personally do not know of any way to make a brake system as disclosed in the Friemann patent capable of stopping the motion of the band cutter within 10 milliseconds after detecting contact between a person and the cutter. My opinions are explained in the following paragraphs.

9. Friemann discloses a protective circuit for a band cutter used in the textile industry. (Friemann, column 1, lines 5-11.) The machine includes a band cutter looped around three rollers and one pulley. (Friemann, Fig. 2.) A motor drives the pulley to move the cutter and a user slides a piece of textile past the moving cutter to cut the textile. The protective circuit is designed to stop the cutter in the event a person touches the moving cutter. (Friemann, column 1, lines 45-47.) The protective circuit stops the cutter by triggering direct current

braking of the motor and by triggering an electromechanical brake to decelerate the drive pulley or flywheel of the motor. (Friemann, column 3, lines 66-68 & column 4, lines 3-5.) Stopping the motor and pulleys causes the band cutter to stop. More specifically, the circuit includes an oscillator with a voltage output connected to a bridge circuit. The bridge circuit is balanced until an operator touches the band cutter at which time the bridge circuit becomes unbalanced and a voltage is transmitted to an amplifier circuit which, in turn, trips relays to supply power to the DC braking and electromechanical brake. (Friemann, column 3, line 35 to column 4, line 6.)

10. The relays disclosed in the Friemann patent that switch power to the motor and electromechanical brake are shown as standard relays. Such relays conservatively take 5 to 15 milliseconds or more to operate. Attached as exhibit 2 are specifications for standard motor control relays showing coil operating times of 10 to 25 milliseconds.

11. Friemann discloses two embodiments of circuits to control the motor and electromechanical brake. In the first embodiment Friemann states that relay R1 is energized when a person contacts the cutter. (Friemann, column 3, lines 53-55.) Relay R1 then closes contact pair $R1_1$ - $R1_2$ and that contact pair energizes relay *h*2 to close contact *h*2_1. Closing contact *h*2_1 then energizes relay *c*2 and energizing relay *c*2 connects direct current to the motor and alternating current to the electromechanical brake. It is only after relays R1, *h*2 and *c*2 are sequentially energized that braking can begin. (Friemann, column 3, line 53 to column 4, line 3.) That means the DC braking of the motor and the

electromechanical brake cannot even begin to operate in this embodiment until 15 to 45 milliseconds after the system detects contact because each relay takes 5 to 15 milliseconds to energize. In the second embodiment, relay R1 is energized when a person contacts the cutter. (Friemann, column 4, lines 38-40.) Relay R1 then closes contactor pairs $R1_1$ - $R1_2$ and $R1_5$ - $R1_6$ and opens contactor pair $R1_3$ - $R1_4$. Those contactors, in turn, actuate an electronic reversing switch and energize a second relay *c2*. The electronic reversing switch switches power to the motor and relay *c2* switches power to the electromechanical brake. (Friemann, column 4, lines 40-53.) In this embodiment, the DC braking of the motor cannot begin to operate until after relay R1 and the electronic reversing switch are sequentially energized, and the electromechanical brake cannot begin to operate until after relays R1 and *c2* are sequentially energized.

12. Because Friemann's braking system uses standard relays, Friemann's motor braking and electromechanical brake will not even begin to operate within 10 milliseconds after detection of contact between a person and the band cutter. I am aware that Dr. Stephen F. Gass has submitted a declaration signed April 26, 2004 in connection with this application, and he discussed this point in his declaration. I have read, studied and understand Dr. Gass' declaration and I agree with Dr. Gass' discussion of this point.

13. After the relays have energized, the motor brake and the electromechanical brake disclosed in Friemann operate to decelerate the band cutter. However, even if the relays could switch power to the motor and brake

instantaneously, which they cannot, the motor and brake still could not stop the band cutter within 10 milliseconds because motors take time to stop and brakes take time to engage.

14. The motor used in Friemann's machine is an AC induction motor. This is evident from the disclosure in the patent showing that the motor is connected to 3-phase power and from the disclosure showing how to connect direct voltage to two phases of the motor to cause DC braking. (Friemann, Fig. 4, column 3, lines 34-41 and 65-67.) I do not know of any AC induction motor capable of stopping Friemann's band cutter within 10 milliseconds by application of DC braking. The rotational inertia of the motor armature prevents that result.

15. The rotational inertia of the armature in Friemann's motor will depend on the speed at which the armature is spinning. That speed can be calculated from Friemann's statement that the usual speed of a band cutter is 14 meters per second (Friemann, column 2, lines 18-19) and from the size of the rollers and pulley used in Friemann's system. Figure 2 in Friemann shows the size of the rollers and pulley in relation to the band cutter machine. The machine is positioned on the floor with a table at a standard height above the floor. The radius of each roller and pulley is about 1/5 of the distance from the floor to the table. Tables are typically 34-36 inches above the floor, so the radius of each roller and pulley would be around 6.8 to 7.2 inches or 17.3 to 18.3 cm. That is consistent with my personal knowledge of band cutters. In order to drive the band cutter at 14 meters per second around pulleys with radii of 17 cm, each pulley would have an angular velocity of 82.35 radians per second. Figure 2 in

Friemann also shows a motor pulley that is approximately one half the size of drive pulley 9. Therefore, the motor would have to operate at twice the speed of the drive pulley. I calculated the pulley speed to be 82.35 rad/sec, as set forth above, so the motor speed would then be 164.7 rad/sec or 1572.8 rpm. A motor speed close to that speed and commonly available in different motor sizes is 1760 revolutions per minute.

16. Friemann does not specify any particular size of motor to use in his machine, but band cutters often use 3 horsepower motors. A general purpose, 3 hp, 60 Hz, AC induction motor from Baldor Electric Company (Catalog Number VEM3661T) running at 1760 rpm (184.31 radians per second) has a maximum or break down torque of 31 lb-ft or 42 N-m and a rotational inertia of approximately 0.26 lb-ft^2 or 0.01095 kg-m^2. (The break-down torque of this motor and the break-down torques of other motors discussed herein are taken from performance data set forth by Baldor at www.baldor.com, copies of which are attached as exhibit 3. The rotational inertias of the armatures in the motors discussed herein were obtained during telephone calls with Baldor.) With a torque of 42 N-m, assuming it could be applied instantaneously and continuously over the entire deceleration of the motor armature, which it cannot, the time required to stop the motor armature alone, disregarding the pulleys, would be 48 milliseconds, as shown by the following calculation, where "t" is the time, "ω_0" is the initial angular velocity of 184.31 radians per second, "ω" is the final angular velocity of zero, "I" is the rotational inertia, and "τ" is the torque:

$$t = (\omega_0 - \omega)\, I / \tau$$

$$t = (184.31 \text{ rad/sec} - 0)\ (0.01095 \text{ kg-m}^2) / 42 \text{ N-m}$$

$$t = 0.048 \text{ sec or } 48 \text{ milliseconds.}$$

17. A general purpose, 15 hp, 60 Hz, AC induction motor from Baldor (Catalog Number M2333T) running at 1760 rpm (184.31 radians per second) has a maximum or break down torque of 147 lb-ft or 199.3 N-m and an inertia of approximately 1.38 lb-ft^2 or 0.05811 kg-m^2. With that torque, again assuming the torque could be applied instantaneously and continuously, the time required to stop the armature alone would be:

$$t = (\omega_0 - \omega)\, I / \tau$$

$$t = (184.31 \text{ rad/sec} - 0)\ (0.05811 \text{ kg-m}^2) / 199.3 \text{ N-m}$$

$$t = 0.0537 \text{ sec or } 53.7 \text{ milliseconds.}$$

18. A general purpose, 50 hp, 60 Hz, AC induction motor from Baldor (Catalog Number CM4115T) running at 1770 rpm (185.35 radians per second) has a maximum or break down torque of 399 lb-ft or 540.1 N-m and a rotational inertia of 6.37 lb-ft^2 or 0.2682 kg-m^2. With that torque, again assuming the torque could be applied instantaneously and continuously, the time required to stop the armature alone would be:

$$t = (\omega_0 - \omega)\, I / \tau$$

$$t = (185.35 \text{ rad/sec} - 0)\ (0.2682 \text{ kg-m}^2) / 540.1 \text{ N-m}$$

$$t = 0.092 \text{ sec or } 92 \text{ milliseconds.}$$

19. As can be seen from the analysis of the three typical AC motors presented above, these motors cannot stop themselves in 10 milliseconds.

Therefore it is not possible for these motors to stop themselves plus the rollers and pulley that drive Friemann's band cutter in 10 milliseconds.

20. I am aware of a high performance brushless, 9.1 hp, DC motor capable of stopping its own armature from an operating speed of 1760 rpm in approximately 6 milliseconds (Model BM4500E from Aerotech, Inc. of Pittsburgh, Pennsylvania, having a rotational inertia of 0.00308 kg-m^2). However, that motor has a peak torque of only 94.4 N-m and therefore is too small to stop itself and the band cutter disclosed in Friemann within 10 milliseconds. Using a conservative estimate of 0.092 kg-m^2 for the rotational inertia of the three rollers and one pulley included in Friemann's machine (this inertia is calculated below in paragraph 23), this high performance DC motor would take approximately 86.6 milliseconds to stop itself and the rollers and pulley. This motor and the associated amplifier cost approximately $5700. I am not aware of any larger, more powerful brushless DC motors capable of stopping themselves and Friemann's rollers and pulley within 10 milliseconds. Additionally, the circuitry disclosed in Friemann to control the motor braking would not work with a DC motor.

21. Friemann also discloses using an electromechanical brake. Electromechanical brakes apply electromagnetic force to move an armature into contact with a braking surface. The armature typically is connected to the shaft to be braked and spins with the shaft. When the electromagnetic force moves the armature into contact with the braking surface, friction between the armature and braking surface decelerates both the armature and the shaft. The

electromagnetic force is generated by a wire coil and the size of the coil determines the amount of force that can be applied. However, it takes time to charge the coil to create the electromagnetic force because of the inductance of the coil and it also takes time to move the spinning armature into contact with the braking surface because of the mass and inertia of the armature. As far as I am aware, electromechanical brakes capable of applying a 200 N-m braking torque typically take about a quarter of a second or more to engage. For example, Model EMB-S200A is a standard DC electromechanical brake manufactured by Electric Motor & Transmission Pty. Ltd. that is capable of applying 200 N-m of torque. The time for that brake to engage is 300 milliseconds. A specification sheet showing the operating time for this brake and other brakes is attached as exhibit 4. Larger brakes capable of applying greater stopping torques take even more time to engage because the larger brakes have coils with higher inductance and armatures with more mass. I do not know of any electromechanical brake that can work with a motor brake to stop a band cutter as disclosed in Friemann within 10 milliseconds, and in my opinion, no such electromechanical brake exists.

22. Figure 2 in Friemann shows that the band cutter runs over three guide rollers and one drive pulley. All of those rollers and pulley must stop in order to stop the band cutter. Adding the rotational inertia of the rollers and pulley to the rotational inertia of the motor armature further lengthens the time required for the motor and electromechanical brake to stop the band cutter.

06/22/2005 10:38 5036388601 SAWSTOP LLC PAGE 43/65

23. The radius of each roller and pulley used in Friemann's system is around 6.8 to 7.2 inches or 17.3 to 18.3 cm, as explained above. The mass of the perimeter of each roller and pulley is conservatively no less than 0.8 kg. Based on this information, and considering the mass to be at the perimeter, the rotational inertia of a single roller or pulley can be calculated as follows:

$$I = m\,r^2$$

$$I = (0.8\text{ kg})\,(0.17\text{m})^2$$

$$I = 0.023\text{ kg-m}^2$$

The rotational inertia of three rollers and one pulley would then be 0.092 kg-m^2.

24. Each roller and pulley will have an angular velocity of 82.35 radians per second, as explained above. The torque required to stop the rollers and pulley spinning at that speed within 10 milliseconds can be calculated as follows:

$$\tau = (\omega_0 - \omega)\,I\,/\,t$$

$$\tau = (82.35\text{ rad/sec} - 0)\,(0.092\text{ kg-m}^2)\,/\,0.01\text{ sec}$$

$$\tau = 757.62\text{ N-m.}$$

Friemann's DC motor braking and electromechanical brake must supply this torque instantaneously and continuously after someone touches the band cutter in order to stop the band cutter within 10 milliseconds. That, however, is impossible because motors and brakes big enough to generate that torque cannot operate in that time frame, as explained.

06/22/2005 10:38 5036388601 SAWSTOP LLC PAGE 44/65

25. I am aware that Dr. Gass set forth in his declaration a calculation of the energy of the rollers and pulley when spinning and that he assumed each roller and pulley to have a radius of 20 cm and a mass of 2 kg at the perimeter. I agree with Dr. Gass' calculations for rollers and pulleys of that radius and mass. The radius and mass of rollers and pulleys used by Dr. Gass in his calculations are typical for band cutting machines while the radius and mass used in my calculations are more conservative.

26. The facts expressed herein conclusively establish that the mechanism disclosed in the Friemann patent cannot stop the band cutter within 10 milliseconds after a person touches the band cutter and the statements in the Friemann patent to the contrary are incorrect. I do not know of any way that the mechanism disclosed in the Friemann patent could stop the band cutter within 10 milliseconds after the device detects a person touching the band cutter, and the disclosure in Friemann is insufficient to instruct a mechanical engineer with an ordinary level of skill how to make such a brake mechanism. I do not know of any AC or DC motor or any electromechanical brake that can together stop the band cutter disclosed in Friemann within 10 milliseconds after a person touches the blade and I do not believe they exist.

27. I hereby declare that all statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this declaration is directed.

Date: 5-25-05

David A. Turcic
Dr. David A. Turcic

Resume

Dr. David A. Turcic
Mechanical Engineering Department
Portland State University
P.O. Box 751
Portland, OR 97207-0751

Research and Teaching Interests

Design and Analysis of High Speed Elastic Mechanisms, Motion Synthesis, Design for Manufacturing, Kinematics and Dynamics, System Design, Experimental Methods, Robotics, Automatic Controls, Mechatronics, Vibration Analysis, Computer Aided Design, Computer Aided Manufacturing, Geometric Modeling, Computer Graphics, Finite Element Methods, Numerical Methods, Applied Mathematics

Education

B.S. Mechanical Engineering, The Pennsylvania State University, May 1977

M.S. Mechanical Engineering, The Pennsylvania State University, August 1979
Thesis Adviser: Dr. Robert J. Williams
Thesis Title: A Point-Oriented Kinematic Analysis Procedure for Unconstrained Mechanisms with Interactive Computer Graphics Applications

Ph.D. Mechanical Engineering, The Pennsylvania State University, November 1982
Thesis Adviser: Dr. Ashok Midha
Thesis Title: A General Approach to the Dynamic Analysis of Elastic Mechanism Systems

Positions Held

September 1992 - present: Associate Professor (with tenure in 1994) of Mechanical Engineering, Portland State University, Portland, Oregon

September 1990 - August 1992: President Innovative Engineering Solutions (Engineering Consulting and Software Development Business) and Adjunct Associate Professor of Mechanical Engineering (Part time teaching position), Portland State University, Portland, Oregon

September 1989 - August 1991: Associate Professor (with tenure) of Mechanical Engineering, University of Wisconsin, Madison, Wisconsin

September 1985 - August 1989: Assistant Professor of Mechanical Engineering, University of Wisconsin, Madison, Wisconsin

June 1983 - August 1985: Assistant Professor of Mechanical Engineering and Mechanics, Drexel University, Philadelphia, Pennsylvania

September 1982 - May 1983: Visiting Assistant Professor of Mechanical Engineering, Pennsylvania State University, University Park, Pennsylvania

September 1979 - August 1982: Instructor, Mechanical Engineering, Pennsylvania State University, University Park, Pennsylvania

September 1977 - August 1979: Graduate Assistant Mechanical Engineering, Pennsylvania State University, University Park, Pennsylvania

Refereed Journal Publications

1. Midha, Ashok, David A. Turcic, "On the Periodic Response of a Cam Mechanism with Flexible Follower and Camshaft," ASME Journal of Dynamic Systems, Measurement and Control, Vol. 102, No. 4, December 1980, pp. 255-264.

2. Midha, Ashok, David A. Turcic, James R. Bosnik, "Creativity in the Classroom -A Collection of Case Studies in Mechanism Synthesis," Mechanism and Machine Theory, Vol. 19, No 1, 1984, pp. 25-44.

3. Turcic, David A., Ashok Midha, "Generalized Equations of Motion for the Dynamic Analysis of Elastic Mechanism Systems," ASME Journal of Dynamic Systems, Measurement and Control, Vol. 106, No. 4, Dec. 1984.

4. Turcic, David A., Ashok Midha, "Dynamic Analysis of Elastic Mechanism Systems, Part I: Applications," ASME Journal of Dynamic Systems, Measurement and Control, Vol. 106, No. 4, Dec. 1984.

5. Turcic, David A., Ashok Midha, James R. Bosnik, "Dynamic Analysis of Elastic Mechanism Systems, Part II: Experimental Results," ASME Journal of Dynamic Systems, Measurement and Control, Vol. 106, No. 4, Dec. 1984.

6. Krishnamurty, Sundar, David A. Turcic, "A General Method of Determining and Eliminating Branching in Planar Multiloop Mechanisms," ASME Journal of Mechanisms, Transmissions, and Automation in Design, Vol. 110, No. 4, Dec. 1988.

7. Nagarajan, Subra, David A. Turcic, "General Methods of Determining Stability and Critical Speeds for Elastic Mechanism Systems," Mechanism and Machine Theory, Volume 25, No. 2, pp. 209-223, 1990

06/22/2005 10:38 5036388601 SAWSTOP LLC PAGE 48/65

8. Nagarajan, Subra, David A. Turcic, "Lagrangian Formulation of the Equations of Motion for Elastic Mechanisms With Mutual Dependence Between Rigid Body and Elastic Motions, Part I: Element Level Equations," ASME Journal of Dynamic Systems, Measurement, and Control, Vol. 112, pp. 203-214, June 1990.

9. Nagarajan, Subra, David A. Turcic, "Lagrangian Formulation of the Equations of Motion for Elastic Mechanisms With Mutual Dependence Between Rigid Body and Elastic Motions, Part II: System Equations," ASME Journal of Dynamic Systems, Measurement, and Control, Vol. 112, pp. 215-224, June 1990.

10. Nagarajan, Subra, David A. Turcic, "Dynamic Stability Considerations in Elastic Closed Loop Linkage Systems," ASME Journal of Mechanical Design, Vol. 114, No. 1, pp. 131-136, March 1992.

11. Nagarajan, Subra, David A. Turcic, "Experimental Verification of Critical Speed Ranges for Elastic Closed Loop Linkage Systems," ASME Journal of Mechanical Design, Vol. 114, No. 1, pp. 126-131, March 1992.

12. Krishnamurty, Sundar, David A. Turcic, "Optimal Synthesis of Mechanisms Using Nonlinear Goal Programming Techniques," Mechanism and Machine Theory, Vol. 27, No. 5, pp. 599-612, June 1992.

13. Krishnamurty, Sundar, David A. Turcic, "Branching Determination in Non-Dyadic Planar Multiloop Mechanisms," ASME Journal of Mechanical Design, Vol. 114, No. 2, pp. 245-250, June 1992.

14. Williams, Daniel W. , David A. Turcic, "A Point-Oriented Kinematic Analysis Procedure for Flexible Open-Loop Mechanisms," Mechanism and Machine Theory, Vol. 27, No. 6, pp. 701-714, July 1992.

15. Jablokow, Andrei, Subra Nagarajan, David A. Turcic, "A Modal Analysis Solution Technique to the Equations of Motion for Elastic Mechanism Systems Including the Rigid-Body and Elastic Motion Coupling Terms," ASME Journal of Mechanical Design, Vol. 115, No. 2, pp. 314-323, June 1993.

16. Jablokow, Andrei, John J. Uicker Jr., David A. Turcic, "Topological and Geometric Consistency in Boundary Representations of Solid Models of Mechanical Components," ASME Journal of Mechanical Design, Vol. 115, No. 4, pp. 762-769, December 1993.

17. Jablokow, Andrei, John J. Uicker Jr., David A. Turcic, "Verification of Boundary Representations of Solid Models," ASME Journal of Mechanical Design, Vol. 116, No. 2, pp. 666-668, June 1994.

Refereed Conference Papers

18. Turcic, David A., Robert J. Williams, "Positioning and Manipulation of Three-Dimensional Mechanisms using Interactive Computer Graphics and Stereo Pair Drawings," Proceedings of the Second International Computers in Engineering Conference, San Diego, California, August 1982, Vol. 1, pp. 81-87.

19. Turcic, David A., Robert J. Williams, "A Point-Oriented Kinematic Analysis Procedure for Spatial Open-Loop Mechanisms," Proceedings of the Third International Computers in Engineering Conference, Chicago, Illinois, August 1983, Vol. 2, pp. 157-167.

20. Turcic, David A., Ashok Midha, "Modeling of High-Speed Elastic Mechanisms for Vibration Response," Proceedings of the Third International Computers in Engineering Conference, Chicago, Illinois, August 1983, Vol. 2, pp. 81-92.

21. Turcic, David A., Andrei Jablokow, James Hamerslag, Susan Herman, "Computer Aided Design and Computer Aided Manufacturing Software for an Engineering Educational Environment," Proceedings of the 1987 ASME International Computers in Engineering Conference, New York, New York, August 1987.

22. Jablokow, Andrei G., David A. Turcic, T. M. Tan, "Tool path Simulation of APT Programs on Micro-Computers," Proceedings of the 1987 ASME International Computers in Engineering Conference, New York, New York, August 1987.

23. Krishnamurty, Sundar, David A. Turcic, "Nonlinear Goal Programming Techniques in the Synthesis of Mechanisms," Proceedings of the 1987 ASME Design Automation Conference, Boston, MA, September 1987.

24. Krishnamurty, Sundar, David A. Turcic, "DAMP - A General Purpose Optimization Program for Modeling, Analysis and Synthesis of Mechanisms," Proceedings of the 1991 ASME Computers in Engineering (CIE) Conference, San Jose, CA, August 1991.

25. Lee, Danny V., David A. Turcic, "Determination of the Coefficient of Restitution of a Bat-Ball System," Proceedings of the 2001 Society of Experimental Mechanics (SEM) Conference, pp. 129-132, Portland, OR, June 2001.

26. Turcic, David A., Swavik A. Spiewak, "Vibration Transmissibility Characteristics of a Newly Designed Bus Driver's Seat," Proceedings of the 2001 Society of Experimental Mechanics (SEM) Conference, pp. 133-136, Portland, OR, June 2001.

Invited Chapters in Books

1. Advanced Mechanism Design: Analysis and Synthesis Volume 2, by G. N. Sandor and A. G. Erdman , Prentice-Hall, 1984, Chapter 5, "Dynamics of Mechanisms: Advanced Concepts," Sections 5.19 - 5.30 ,"Analysis of High Speed Elastic Mechanisms", by Ashok Midha and David A. Turcic (Based on Turcic's Ph. D. Dissertation).

Teaching

Courses Taught

ME 66	Computer Programming and Numerical Analysis
ME 88	Engineering Senior Design I
ME 99	Engineering Senior Design II
E020	Senior Project Design I
E021	Senior Project Design II
E022	Senior Project Design III
EAS 213	Materials Science
EAS 215	Dynamics
ME 340	Introduction to Dynamic Systems
ME 311	Mechanical Vibrations
ME 351	System Dynamics
ME 490	SAE Student Formula Car Competition
ME 490	SAE Student Baja Car Competition
ME 491	Senior Capstone Design Sequence
ME 492	Senior Capstone Design Sequence
ME 493	Senior Capstone Design Sequence
ME 551	Engineering Analysis and Applied Mathematics
ME 452/552	Introduction to Control Engineering
ME 453/553	Control System Design
ME 463/563	Digital Control Systems

Development of New Courses

MEM 646	Introduction to CAD/CAM
ME 741	Analysis and Design of High Speed Mechanisms with Elastic Members
ME 964-2	Applied Computer Methods In Mechanical Engineering

ME 410/510 Mechanical Systems Design
ME 410/510 Controls Laboritory

Graduate Students

Completed Degrees

1.	Tom Manning,	M.S.	9/84,	"Mechanism Synthesis"
2.	Jim Hamerslag,	M.S.	6/85,	"CAD/CAM Software for use on Mico-computers"
3.	Subra Nagarajan,	M.S.	9/85,	"Stability Considerations in Elastic Mechanism Systems"
4.	Dan Williams,	M.S.	12/86,	"Interactive Manipulation of Three-Dimensional Information Using Stereoscopic Computer Graphics"
5.	George Skupniewicz,	M.S.	5/87,	"Design and Implementation of a Compact Mechanical Shaker"
6.	Sundar Krishnamurty,	Ph.D.	7/89,	"Multiple Objective Optimization Techniques in the Design of Mechanisms"
7.	Andrei Jablokow,	Ph.D.	7/89,	"Validity of Boundary Representations of Solid Models"
8.	Subra Nagarajan,	Ph.D.	7/89,	"Modeling and Stability of High Speed Elastic Mechanism Systems"
9.	Dan Williams,	Ph.D.	6/90,	"Flexible Robotic Manipulator Control: Modeling, Simulation, and Experimentation"
10.	Chung-Hang Pan,.	M.S.	6/90,	"Clearance Considerations in Elastic Mechanisms"
11.	Cornel Danciu	M.S.	9/95	"Modeling of the Human Cardiovascular System"
12.	Jeff Palmer	M.S.	3/96	"Comparison of Flight Control Systems"
13.	Anthony Clinch	M.S.	3/97	"Tool Condition Monitoring: A Computational Approach"
14.	Terrence Smith	M.S.	9/97	"Limitations of Methods for Determining the Position of the Center of Mass of a Human Subject Performing a Sit-Up"
15.	Timothy Nuckolls	M.S.	6/2000	"Theortical and Experimental Model of a High Speed Drilling Process"
16.	Jeff Lusardi	M.S.	6/2000	"Modeling and Control of Machines Mounted on Elastic Fondations"
17.	Danny Lee	M.S.	6/2000	"Determination of the Coefficient of Restitution of a Bat-Ball System"

18. David Kloewer	M.S.	6/2002	"Study of Constrained Layer Damping Properties"
19. Wendell Calkins	M.S.	6/2002	"Design of an Instrimentation and Control System for A Two Link Flexible Manipulator"
20. Jermiah Smith	M.S.	6/2003	"Design and Fabrication of a Softball and Baseball Test Apparatus"
21. Mark B. Sommers	M.S.	6/2003	"Hip Fixation Methods"
22. Robert Beale	M.S.	3/2004	"Active Vibration Damping of Neonatal Patients in Transport"
23. Marcus Mohr	M.S.	3/2004	"Geometric Characterization of Human Ribs"

Service in Professional Organizations

- Reviewer for the Dynamic Systems and Control Division of NSF
- Reviewer for the following ASME Journals:
    - *Journal of Mechanisms, Transmissions, and Automation in Design*
    - *Journal of Dynamic Systems, Measurement, and Control*
    - *Journal of Engineering for Industry*
- Reviewer for *Mechanism and Machine Theory*
- Session Chairman and Vice Chairman, Design Automation and Mechanisms Conferences
- Former Member, Machine Dynamics Sub-committee of the ASME Mechanisms Committee

45 MM CENTSABLE CONTACTOR SPECIFICATIONS

45mm Centsable Contactor Specification Guide

Insulation Voltage	AC	(V)	690 Volts AC				
Ampere Rating	Max. UL Amps (AC3) note 1	(A)	9	12	18	25	[illegible]
	AC1 Thermal Current (Ith) note 2	(A)	30	30	40	45	[illegible]
Maximum Power (hp) of Three-Phase Motors	200V	(HP)	2	3	3	7.5	[illegible]
	208/240V	(HP)	2	3	5	7.5	[illegible]
	480V	(HP)	5	7.5	10	15	[illegible]
	575V	(HP)	7.5	10	15	20	[illegible]
Maximum Power (hp) of Single-Phase Motors	115V	(HP)	.5	.5	1	2	[illegible]
	230/240V	(HP)	1	2	3	3	[illegible]
Maximum Power (kW) of Three-Phase Motors IEC Category AC3	220/240V	(kW)	2.2	3	4	6.5	[illegible]
	400V	(kW)	4	5.5	7.5	11	[illegible]
	440/480V	(kW)	4.7	6.4	9	12.5	[illegible]
	500V	(kW)	6.5	7.5	10	11	[illegible]
	690V	(kW)	5.5	7.5	7.5	11	[illegible]
Short Circuit Protection Fuses Class J	Type 2 Coordination note 3	(A)	20	25	32	40	[illegible]
Auxiliary Contacts Switching Capacity			A600 note 4				
Coil Voltage Operating Limits			A.C. Pick-up 85-110% rated control voltage / A.C. Drop-out 20-75% rated control [illegible]				
Average Coil Power Requirements / Coil current (A) = VA/Coil Voltage			A.C. Pick-Up (VA) 80-100 / A.C. Sealed (VA) 9-12				
Power Factor			Pick-up .55 / Sealed .35				
Coil Operating Time at Rated Coil Voltage			Pick-up (mS) 10-25 / Drop-out (mS) 5-18				
Maximum Operating Frequency (No-Load Operation)			3000 operations / hour				
Mechanical Durability			10,000,000 operations				
Electrical Durability			1,000,000 operations				
Operating Ambient Temperature			-25 to +55C (-13 to +131F)				
Degree of Protection Design			IP20 (IP1X for power entry cables)				
Mounting			Screw or 35mm DIN rail				
Wire Sizes	Line / Load		10 AWG			8 AWG	
	Control & Auxiliary Contacts		#12-#14 AWG (stranded recommended)				

Notes:
1. AC3 type loads consist of squirrel cage three-phase motors.
2. AC1 non-inductive or slightly inductive loads. Typically resistive loads (i.e. furnaces, lamps, etc.)
3. Type 2 coordination is a protection category for IEC 60947-4-1, Section 8.2.5.1 specifies that Type 2 coordination requires that, under short circuit conditions, the contactor [illegible] cause no danger to persons or installation and shall be suitable for further use. The risk of minor contact welding is possible.
4. A600 is a NEMA rating given to switching devices. The A600 rating in particular is 10 amp continuous thermal current with a maximum 60 amp make current and a 6 amp break [illegible] volts AC. Consult NEMA ICS 5-2000, Part 1 Table 1-4-1 for more detailed specifications.

1-800-633-0405

BEST AVAILABLE COPY

Page 1 - Declaration of Dr. David A. Turpin, Exhibit 2
Serial No. 10/100,211

06/22/2005 10:38 5036388601 SAWSTOP LLC PAGE 54/65

Cutler-Hammer Contactor Specifications

45 mm Cutler-Hammer CE15 Contactor Specifications

Insulation Voltage	AC	(V)	690 Volts AC				
Ampere Rating	Max UL Amps (AC3) note 1	(A)	7	10	12	18	25
	AC1 Thermal Current (600V) note 2	(A)	20	20	20	32	32
Maximum Power (HP) of Three-Phase Motors	200V	(HP)	1.5	2	3	5	8
	230/240V	(HP)	1.5	2	3	5	7.5
	460/480V	(HP)	3	5	7.5	10	15
		(HP)	5	7.5	10	15	20
Maximum Power (HP) of Single-Phase Motors	115V	(HP)	0.25	0.5	0.5	1	2
	230/240V	(HP)	0.5	1	2	3	3
Maximum Power (kW) of Three-Phase Motors AC3 Category note 1	220/240V	(kW)	1.1	1.5	2.2	4	5.5
	415/440V	(kW)	2.2	4	5.5	7.5	11
	500/550V	(kW)	2.2	4	5.5	7.5	11
	500V	(kW)	4	5.5	7.5	11	15
	600V	(kW)	1.5	2.2	4	5.5	7.5
Auxiliary Contacts Electrical Capacity			A600 note 4				
Coil Voltage Operating Limits			A.C. Pick-Up 85-110% Rated Control Voltage / A.C. Drop-Out 20-75% Rated Coil				
Average Coil Power Requirements / Coil current (A) – VA/Coil Voltage			A.C. Pick-Up (VA) 60-100 / A.C. Sealed (VA) 9-12				
Power Factor			Pick-Up .65 / Sealed .35				
Coil Operating Time at Rated Coil Voltage			Pick-Up (mS) 10-25 / Drop-Out (mS) 8-18				
Maximum Operating Frequency (No-Load Operation)			3000 Operations / Hour				
Mechanical Durability			10,000,000 Operations				
Electrical Durability			1,000,000 Operations				
Operating Ambient Temperature			-25 to +55C				
Standard Protection Degree			IP20 (IP10 for CE15ET and CE15FT)				
Mounting			Screw or 35mm DIN Rail				
Wire Size	Line / Load		#10 - #14 AWG Stranded Recommended			#14 - #8 Stranded Recommended	
	Control & Auxiliary Contacts		#12 - #14 AWG (Stranded Recommended)				
Line/Load Tightening Torque	Nm (Inch Pounds)		7	7	7	15	15

Notes
1. AC3 type loads consist of squirrel cage three phase motors.
2. AC1 non-inductive or slightly inductive loads. Typically resistive loads (i.e. furnaces, ovens, etc.)
3. Type 2 coordination is a protection category for IEC 60947-4-1. Section 8.2.5.1 specifies that Type 2 coordination requires that under short circuit conditions, the contactor or starter shall cause [illegible] or installation and shall be suitable for further use. The risk of contact welding is possible.
4. A600 is a NEMA rating [illegible]. The A600 rating is [illegible] thermal current with a maximum [illegible] of 120 volts AC [illegible] NEMA ICS 5-1993, Sec. [illegible] Table 1-4-1 for more detailed specifications.

Cutler-Hammer CE15 Series Contactor Part Numbers

IEC Frame Size	Cutler-Hammer Contactor Model	Part Number	Price	Number of Contacts: Main	Auxiliary Contacts Included: N.O.	Auxiliary Contacts Included: N.C.	Coil Voltage and Frequency	Additional Contacts: Maximum Contact Block Arrangement	Additional Contacts: Type of Additional Contact Block
45 mm	CE15AN	CE15AN4AB	$38.25	4			110-120VAC 50-60Hz	Up to two auxiliary contact blocks may be added to CE15 contactors (one per side)	Side mount C320KGS[illegible] (1 N.O. and 1 N.C.) C320KGS[illegible] (1 N.O. and 1 N.C.)
		CE15AN4BB	$38.25	4			220-240VAC 50-60Hz		
	CE15BN	CE15BN4AB	$39.00	4			110-120VAC 50-60Hz		
		CE15BN4BB	$39.00	4			220-240VAC 50-60Hz		
	CE15CN	CE15CN4AB	$48.75	4			110-120VAC 50-60Hz		
		CE15CN4BB	$48.75	4			220-240VAC 50-60Hz		
	CE15DN	CE15DN3AB	$56.25	3	1		110-120VAC 50-60Hz		
		CE15DN3BB	$56.25	3	1		220-240VAC 50-60Hz		
	CE15EN	CE15EN3AB	$63.00	3	1		110-120VAC 50-60Hz		
		CE15EN3BB	$63.00	3	1		220-240VAC 50-60Hz		
	CE15FN	CE15FN3AB	$71.50	3	1		110-120VAC 50-60Hz		
		CE15FN3BB	$71.50	3	1		220-240VAC 50-60Hz		

Note: Holding circuit contact(s) supplied standard: a N.O. auxiliary contact block is mounted on the right-hand side. (On Sizes A-C, contact occupies fourth power pole position–no increase in width.)

1-800-633-0405

BEST AVAILABLE COPY

Page 2 - Declaration of Dr. David A. Turcic, Exhibit 2
Serial No. 10/100,211

BALDOR

Product Quick Search VEM3661T GO

HOME | WHERE TO BUY | CONTACT US | SITE MAP

PRODUCTS SUPPORT NEWS/EVENTS ABOUT BALDOR INVESTOR RELATIONS

General Information

- Products
- Specifications
- Performance Data
- Parts List
- Layout Dwg
- Connection Diag
- Product Literature

More Information

- Locate Distributor
- Baldor Sales Offices

Return to List

AC Motors | General Purpose |

Performance Data: VEM3661T

Rating - Nominal	
Rated Output	3 HP
Volts	230/460
Full Load Amps	8/4
Speed	1760
Hertz	60
Phase	3
NEMA Design Code	B
LR KVA Code	H
Efficiency	89.5
Power Factor	80
Service Factor	1.15
Rating - Duty	40C AMB-CONT

Characteristics	
Full Load Torque	9 LB-FT
Break Down Torque	31 LB-FT 344 % of F.L. Torque
Locked-Rotor Torque	22 LB-FT
Starting Current (Amps)	32.0
No-Load Current (Amps)	2.2
Line-line Resistance @ 25° C	
Temperature Rise, C @ FL (in deg)	43

Load Characteristics - Tested

% of Rated Load	25	50	75	100	125	150	S.F.
Power Factor	37	58	71	77	81	83	79
Efficiency	84.0	89.1	90.0	89.7	88.7	87.3	89.1
Speed (rpm)	1788	1778	1767	1756	1743	1729	1749
Line Amperes	2.3	2.8	3.4	4.1	4.9	5.8	4.6

* For certified information, contact your local Baldor office.

Products | Support | News/Events | About Baldor | Investor Relations | Home

BEST AVAILABLE COPY

Performance Data: M2333T

Rating - Nominals		Characteristics	
Rated Output	15 HP	Full Load Torque	45 LB-FT
Volts	230/460	Break Down Torque	147 LB-FT 327 % of F.L. Torque
Full Load Amps	38.4/19.2	Locked-Rotor Torque	78 LB-FT
Speed	1760	Starting Current (Amps)	120.0
Hertz	60	No-Load Current (Amps)	8.4
Phase	3	Line-line Resistance @ 25° C	
NEMA Design Code	B	Temperature Rise, C @ FL (in deg)	61
LR KVA Code	H		
Efficiency	91.0		
Power Factor	80		
Service Factor	1.15		
Rating - Duty	40C AMB-CONT		

Load Characteristics - Tested

% of Rated Load	25	50	75	100	125	150	S.F.
Power Factor	42	65	75	80	82	80	0
Efficiency	85.7	91.0	92.0	91.8	91.1	89.9	0.0
Speed (rpm)	1792	1785	1777	1767	1758	1745	0
Line Amperes	9.2	11.8	14.9	19.0	23.3	28.3	21.6

* For certified information, contact your local Baldor office.

BEST AVAILABLE COPY

BALDOR

Product Quick Search
CM4115T
Go

HOME | WHERE TO BUY | CONTACT US | SITE MAP

PRODUCTS SUPPORT NEWS/EVENTS ABOUT BALDOR INVESTOR RELATIONS

General Information
- Overview
- Specifications
- Performance Data
- Parts List
- Drawings
- Connection Diagram
- Product Literature

More Information
- Locate Distributor
- Baldor Sales Offices

Return to List

AC Motors | General Purpose |

Performance Data: CM4115T

Rating - Nominals		Characteristics	
Rated Output	50 HP	Full Load Torque	148 LB-FT
Volts	230/460	Break Down Torque	399 LB-FT 270 % of F.L. Torque
Full Load Amps	118/59	Locked-Rotor Torque	240 LB-FT
Speed	1770	Starting Current (Amps)	351.0
Hertz	60	No-Load Current (Amps)	20.3
Phase	3	Line-line Resistance @ 25° C	
NEMA Design Code	B	Temperature Rise, C @ FL (in deg)	66
LR KVA Code	G		
Efficiency	93.0		
Power Factor	83		
Service Factor	1.15		
Rating - Duty	40C AMB-CONT		

Load Characteristics - Tested

% of Rated Load	25	50	75	100	125	150	S.F.
Power Factor	54	74	82	85	86	85	85
Efficiency	89.8	92.6	93.2	93.0	92.4	91.4	92.6
Speed (rpm)	1793	1786	1779	1771	1763	1754	1766
Line Amperes	24.7	34.1	46.0	59.2	73.9	90.1	68.0

* For certified information, contact your local Baldor office.

BEST AVAILABLE COPY

Electromagnetic Brakes & Clutches

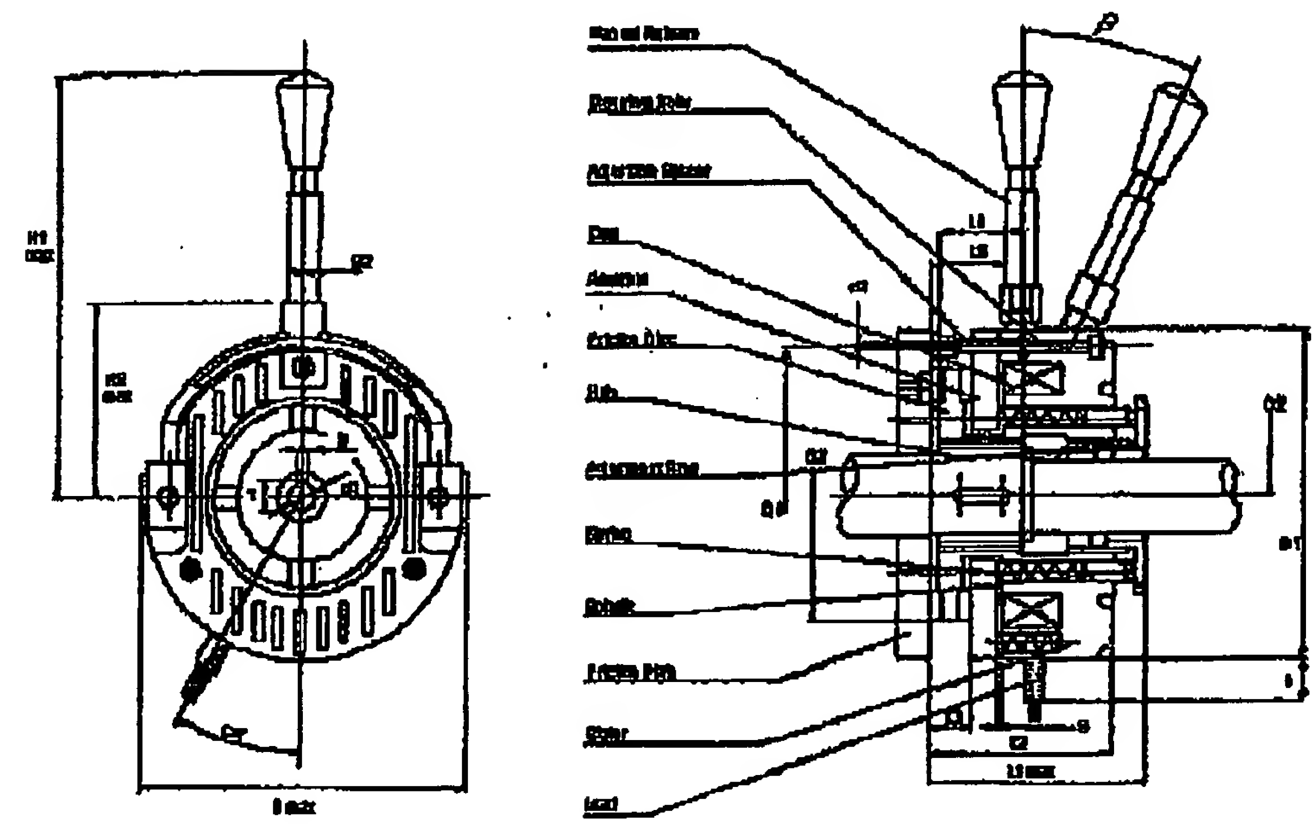
Type: EMB-L-S Electromagnetic Disc Brake

- Fail Safe braking operation
- Long wearing brake disc lining
- High switching frequency
- Adjustable braking torque
- No irritating brake noise
- Manual hand release.

Brake Design:
The EMB-L-S is a Fail-Safe type, electromagnetic disc brake. This means the brake is applied when the current to the electromagnet is switched off. The electromagnet is de operated, which makes it simple, eliminates hum and vibration, gives low energising current and makes it possible to adjust the brake engaging time. i.e. the time from when the current is interrupted to when the braking action commences. The coil of the electromagnet is dimensioned for continuous operation and it is encapsulated in the stator housing with an epoxy compound that makes it insensitive to moisture and vibration.

The braking torque can be adjusted manually and operation of the brake is unaffected by the mounting arrangement. When the electromagnet of the brake is de-energised, the braking torque is applied by pressure from a series of helical compression springs. The axial movement of the brake disc brings about a double-sided braking action without transmitting any thrust or impacts to motor shaft bearings. The friction material has high resistance to wear, good thermal conductivity and a uniform coefficient of friction even at high temperatures. The brakes can therefore handle high frequencies of braking without fading. The primary area of application is for electric motors. For this reason the EMB-L-S brake has been designed to take into consideration the dimensions of standard motors, however in principle their use is suitable for any application where fail-safe brakes are required. As standard, all EMB-L-S brakes are supplied with a Manual Hand release that allows safe movement of the load even when no power is available.

06/22/2005 10:38 5036388601 SAWSTOP LLC PAGE 59/65

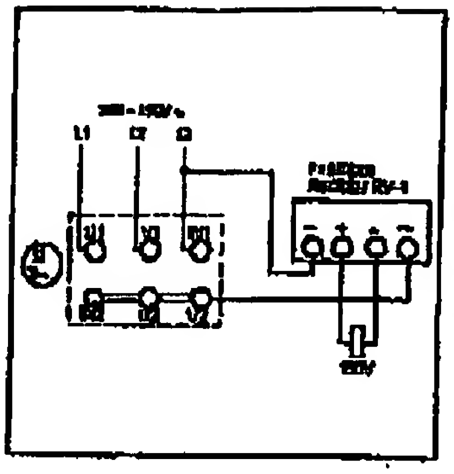


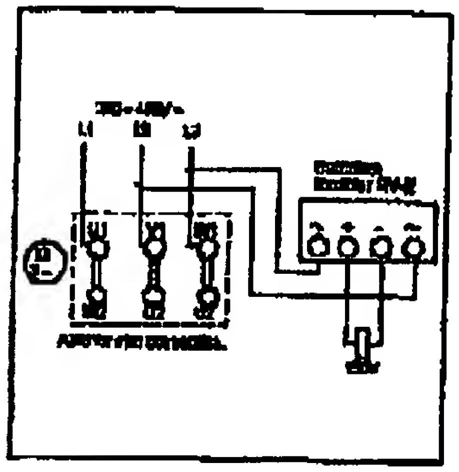
Mounting.
EMB-L-S brakes are supplied adjusted to the nominal values of braking torque and air gap. Maximum torque is achieved after a brief running-in period. When the wear of the friction disc has reached the minimum permissible lining thickness the air gap must be re-adjusted to the nominal air gap as recommended. The Friction Plate should be suitably mounted to the motor endshield or appropriate surface. Fit the Hub onto the drive shaft and secure axially. Fit the Friction Disc onto Hub and assemble Armature and Stator components. Set the air-gap clearance to the specified measurement using a feeler gauge and tighten the mounting bolts. The clearance should be uniform all around. The friction surfaces must be kept free from oil or grease.

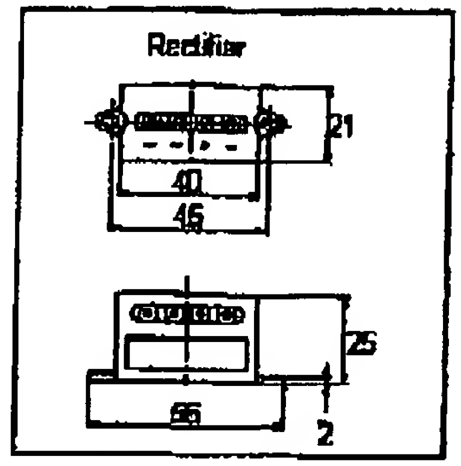
Connection.
EMB-L-S brakes are supplied as standard with a coil voltage rated for 190V DC. Alternative voltage ratings such as 24V, 90V and 207V can be supplied upon request. The electromagnet operates reliably at voltages between 90% and 110% of the rated voltage. When the power supply is from an AC voltage source, the brake coil must be connected via a rectifier.2 x rectifiers are available, Full Wave (type RV-1) for 240V AC input and Half Wave (type RV-2) for 415V AC input.

06/22/2005 10:38 5036388601 SAWSTOP LLC PAGE 60/65

BEST AVAILABLE COPY







Faster brake operation time can be achieved by separate switching of the AC input to the rectifier or the DC output to the electromagnetic coil. The operating times stated are based on DC switching at nominal air-gap. They are average values and are dependent upon coil temperature and the method of rectification.

Type	EMB-L-S4	EMB-L-S7.5	EMB-L-S15	EMB-L-S30	EMB-L-S60	EMB-L-S80	EMB-L-S150	EMB-L-S240
Torque (Nm)	4	7.5	15	30	60	80	150	240
Power (Watt)	28	25	30	40	52	58	85	140
Rated Speed for 100% Torque (rpm)	3600	3600	3600	3600	3600	3600	1800	1800
Operating Time Engage (<ms)	30	71	92	125	142	155	280	250
Operating Time Disengage (<ms)	50	70	75	120	140	180	290	320
Dimensions								
D1	86	103	127	147	165	188	215	252
D2	19	24	35	42	50	52	62	73
D3	58.5	75	95	115	120	149	173	205
D4	72	90	112	132	145	170	196	230
d1 (opt)								
d1 (std)	11	15	20 / 15*	25 / 20*	30 / 25*	35 / 30*	40 / 45*	60 / 65*
d2	8	8	10	10	12	12	16	16
d3	3xM4	3xM5	3xM6	3xM8	3xM8	3xM8	6xM8	6xM10
L1	58	65	65	72	82	92	108	125
L2	49	54	54	56	64	72.6	82.6	100.5
L3	11	11	11.5	11.5	14	14.5	16.5	16.5
L4	20	20	20	25	30	30	35	42
L5	20	22	24	25	32	34	36	45.5
H1	110	112	134	148	184	196	224	246
H2	56	62	74	90	101	112	128	140
t	12.9	17.5	22.9	28.4	33.4	38.4	43.6	69.4
B	93	107	132	152	168	195	226	252
b	4	5	6	8	8	10	12/14	18
S	0.2-0.3	0.2-0.3	0.2-0.3	0.3-0.5	0.3-0.5	0.3-0.5	0.3-0.6	0.6-0.8
α	30	30	30	30	30	30	30	30
β	15	15	15	15	12	12	12	10
h	400	400	400	400	400	400	400	400

Recommended ISO shaft tolerances - up to Ø 50mm = k6 & over Ø 50mm = m6. Hand release angle tolerance ±5°

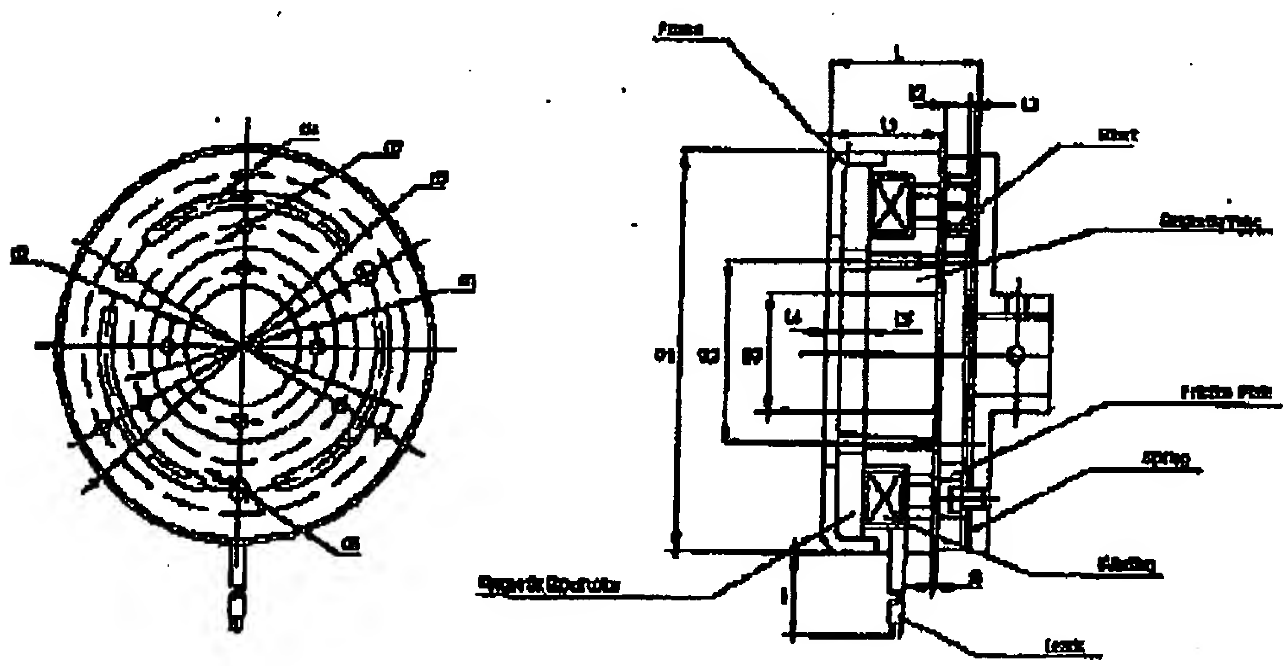
* Optional machined diameter for d1. All dimensions are in mm and subject to change without notice.

BEST AVAILABLE COPY

Type: EMB-S-A Electromagnetic Brakes

- 24V DC Coil
- Dry type single disc brake
- Quick braking from high speed
- Simple construction
- Reliable operation.

Brake Design:
The EMB-S is a dry type electromagnetic brake with a single disk that can quickly achieve mechanical braking from high speed.
The frame and yoke are mounted to a stationary component and the friction plate is attached to a rotating load via the spring disc.
When no voltage is applied to the electromagnetic winding, the friction plate and the load will rotate freely. When a voltage is then applied to the electromagnetic winding, magnetism is produced in the magnetic yoke, therefore quickly braking the friction plate to a standstill. The electro-magnet coil is operated by a 24V DC supply, which makes it simple to operate and easy to control.
The winding of the electromagnet is dimensioned for continuous operation and it is encapsulated in the magnetic yoke housing with an epoxy compound that makes it insensitive to moisture and vibration.
Operation of the brake is unaffected by the mounting position. The friction plate has a high resistance to wear, good thermal conductivity and a uniform coefficient of friction even at high temperatures. These are dry type brakes that can only be used in an oil free environment. The yoke face and the friction plate must be parallel and the load shaft must allow dimension "S" to be maintained.



BEST AVAILABLE COPY

Type	EMB-S12A	EMB-S25A	EMB-S35A	EMB-S50A	EMB-S100A	EMB-S160A	EMB-S200A	EMB-S250A
Torque (Nm)	12	25	35	50	100	160	200	250
Rated Voltage (V dc)	24	24	24	24	24	24	24	24
Power (Watt)	18	30	35	40	60	85	100	125
Rated Speed for 100% Torque (rpm)	4000	3000	3000	3000	3000	2500	2000	1500
Operating Time Engage (<ms)	65	120	130	140	200	240	300	330
Operating Time Disengage (<ms)	25	35	38	40	60	85	100	125
Dimensions (All dimensions are in mm and subject to change without notice)								
D1	88	117	125	150	170	220	206	214
D2	45	62	62	70	85	102	108	110
D3	36	45	45	55	70	82	90	90
d1	44	70	70	90	90	110	110	112
d2	64	95	95	118	118	152	152	152
d3	87	116	123	147	147	180	180	190
d4	4.2	4.2	4.2	5.2	5.2	6.2	6.2	6.2
d5	4xM5	4xM5	4xM6	4xM6	4xM8	4xM8	4xM8	4xM8
d6	4.5	6.2	8.5	8.5	8.5	8.5	8.5	8.5
L	28	31	35	35	40	49	55	58
L1	21.5	22.5	27.5	25	30	37.5	41.5	44.5
L2	6	6.5	6.5	7	7	10	10	12
L3	1	1	1	1	1	1.5	1.5	1.5
L4	6	7	7	7	7	8	8	8
L5	14	14	19	17.5	23	28	32	35
s	0.2 ~ 0.3	0.2 ~ 0.3	0.2 ~ 0.4	0.3 ~ 0.4	0.3 ~ 0.4	0.4 ~ 0.5	0.5 ~ 0.6	0.5 ~ 0.6
h	400	400	400	400	400	400	400	400

Type: EMC-I Electromagnetic Clutch

Page 5 - Declaration of Dr. David A. Turcic, Exhibit 4
Serial No. 10/100,211

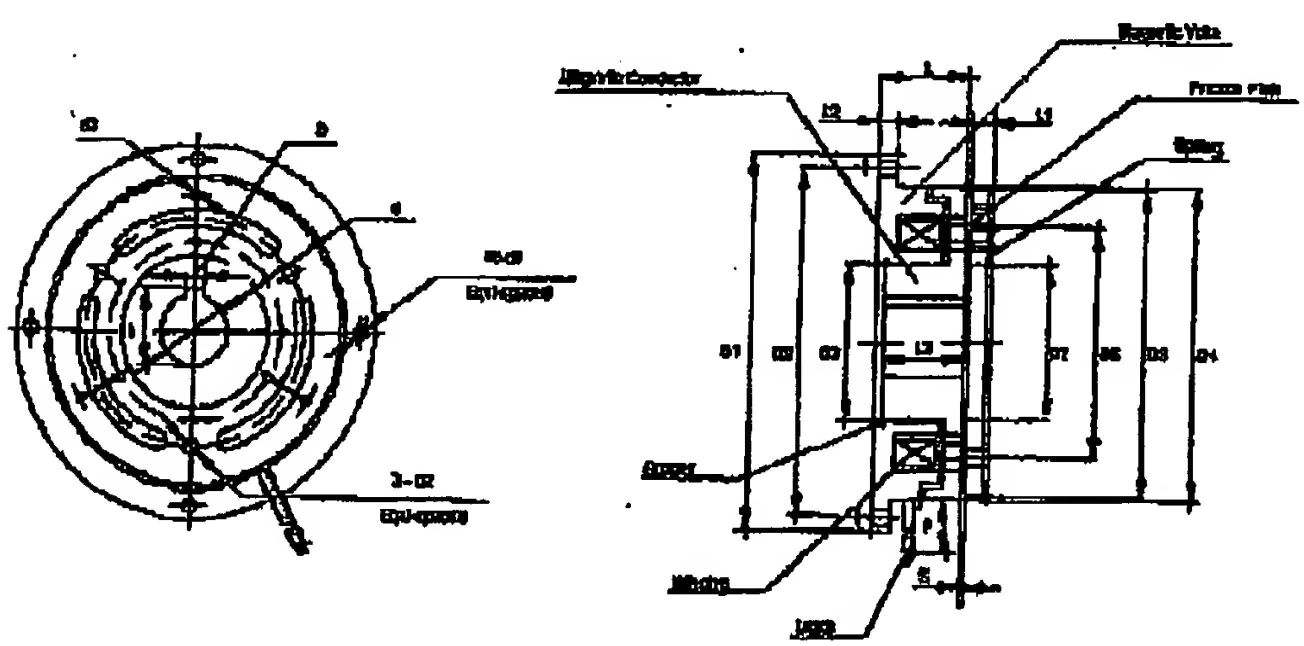
06/22/2005 10:38 5036388601 SAWSTOP LLC PAGE 63/65

BEST AVAILABLE COPY

- 24V DC coil
- For power transfer, braking & overload protection in mechanical transmission systems.
- Independent of rotational direction.
- Simple construction.
- Reliable operation.

Clutch Design:
The EMC-I is an electromagnetic type clutch and friction plate assembly. It is specifically designed for the purpose of power transfer, braking, directional change and overload protection in a mechanical transmission system. The magnetic yoke is mounted onto a stationary component whilst independent shafts drive the magnetic conductor and the friction plate. The friction plate is attached to a rotating load via the spring disc. When no voltage is applied to the winding, the magnetic conductor and the friction plate will rotate independently. When a voltage is applied to the electro-magnetic winding, the friction plate and the magnetic conductor will be magnetically locked. The electromagnetic winding is operated by a 24V DC supply, which makes it simple to operate and control. The winding of the electro-magnet is dimensioned for continuous operation and it is encapsulated in the yoke housing with an epoxy compound that makes it insensitive to moisture and vibration. Operation of the clutch is unaffected by the mounting position. The friction plate has a high resistance to wear, good thermal conductivity and a uniform coefficient of friction even at high temperatures.

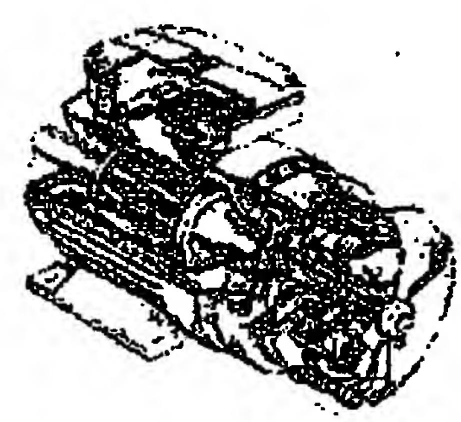
The magnetic conductor and the friction plate must be parallel and the drive shafts must allow dimension "S" to be maintained.



EMC-I Ratings Type	EMC-I-12	EMC-I-25	EMC-I-50	EMC-I-100	EMC-I-160	EMC-I-200
Torque (Nm)	12	25	50	100	160	200

BEST AVAILABLE COPY

Rated Voltage (Vdc)	24	24	24	24	24	24
Power (Watt)	20	22	32	40	45	55
Rated Speed for 100% Torque (rpm)	2500	2000	2000	1500	1500	1500
Operating Time - Engage (<ms)	75	120	140	230	260	300
Operating Time - Disengage (<ms)	25	35	45	60	90	115
Dimensions (All dimensions are in mm and subject to change without notice)						
D1	100	138	168	198	242	252
D2	100	130	160	185	228	236
D3	42	52	62	80	100	110
D4	90	120	150	170	212	220
D5	88	118	148	168	212	220
D6	66	94	118	118	190	190
D7	44	70	90	90	152	152
d (H8)	20	25	30	35	43	50
d1	5.5	5.5	5.5	8.5	8.5	8.5
d2	4.3	6.2	8.5	8.5	10.2	10.2
d3	4.2	4.2	5.5	5.5	6.5	6.5
L	27	31.5	33.5	38	44	50
L1	6.5	7.8	7.8	9	11.5	13.5
h	22.8	28.3	39.3	38.3	46.3	58.8
b	6	8	8	10	12	14
S	0.3	0.4	0.4	0.5	0.5	6
P	500	500	500	500	500	500
W	4	4	6	4	4	6



Contact Information

Electric Motor & Transmission Pty Limited
Sydney (Head Office and Sales): 39 Anvil Rd Seven Hills, 2147 N.S.W, Australia
Tel +61 2 9838 8181 Fax: 61 2 9838 8421
Melbourne (Sales) Tel + 61 3 9796 0355 Fax: + 61 3 9796 0377
E-mail General Information and Customer Support: sales@emtmotor.com.au

Or call from anywhere within Australia for local call cost Ph: 1300 13 9181